University of Washington

ARBORETUM BULLETIN

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Summer 1983, Vol. 46, No. 2

Concerning this issue . . .

Wild trees, wild food plants, wild butterflies, wild gardens—we have them all in this issue.

There are two articles concerning oaks—Arthur Jacobson's brief tour of interesting oak trees in Seattle, and Brian Mulligan's treatment of the handsome evergreen Asiatic oaks of the Arboretum.

Don't miss the second installment of Joseph Witt's account of the Arboretum Horticultural Tour to Korea in autumn of 1982. Through his eyes we see the city of Kwangju, a number of temples, a chestnut harvest and the isolated and traditional island of Ullung.

Flit to butterflies with Sharon Collman's "The Butterfly's World, Notes of a Butterfly Gardener." She presents lots of information about butterflies themselves and about which plants to choose to attract them.

In a more sinister vein, B.J.D. Meeuse describes the insidious peril of some common food plants and some of the other dangers of diet!

And Leslie Norton's philosophy of her woods garden, "In Praise of Wildness," serves as a refreshing interlude.

Best wishes for the holidays from the staff of the Arboretum and the Arboretum Foundation.

SUSAN LIBONATI-BARNES

The ARBORETUM BULLETIN is published quarterly, as a bonus of membership, by the Arboretum Foundation, a non-profit organization to further the development of the Washington Park Arboretum. Information regarding membership in the Foundation may be obtained by writing to the Arboretum Foundation, University of Washington XD-10, Seattle, WA 98195 or by calling (206) 325-4510. Articles on botany and horticulturally-related subjects written by professional and amateur botanists, horticulturists, educators and gardeners are welcomed. No part of the BULLETIN may be reprinted without the authority of the Arboretum Foundation. Typesetting and lithography by Frayn Printing Company.

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Papilio rutulus.
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Photo: Sharon J. Collman

Pinus densiflora at Bulguk-sa, near Kyongju (page 4). Photo: J.A. Witt

A Horticultural Tour of Korea
or Life After M*A*S*H

Part II—Kwangju, Kyongju and Ullung-do

JOSEPH A. WITT

The trip to date: in Part I of this article, the participants in the horticultural tour of South Korea visited the botanical highlights of Seoul's markets and nearby nurseries. They then travelled to the island of Cheju, off the southern tip of Korea. Cheju-do has a semi-tropical flora in the lowlands, changing with elevation to subalpine. It was with regret that the travellers departed from this fascinating island to visit Kwangju, a textile center in the southwestern part of South Korea.

Kwangju and Environs

Kwangju proved to be a distinct change from rural Cheju-do. It is a big city of perhaps a million, industrialized and thronging with traffic. Set in a bowl surrounded by hills and some peaks, it appeared dusty and smog-ridden to us. The smog was due partly to an extended drought plaguing the area, but the location of the city is a contributing factor. The main streets were lined with trees of several species including some which came as a surprise: dawn redwood *(Metasequoia glyptostroboides)*, deodar cedar *(Cedrus deodara)* and some species of weeping willow. They seemed well cared for and thriving despite the pollution.

Once established in our hotel, fortunately located high above the city's smog, we set out to visit the local museum to see an exhibit of eleventh- and twelfth-century celadon ware, ceramic items glazed with a shiny, transparent, very pale greenish glaze. The museum was set well back from a major street, and though this was Saturday afternoon, the long walk to its entrance was lined with hundreds of high school aged children all dressed in school uniforms. They were there to view an exhibit of Pablo Picasso's art and were pouring in and out of the museum doors at a great rate. This gave us our first lesson in the importance the Korean people place on education. Later in the day we drove up to a resort-like area on Mudung-san, a mountain of perhaps 5,500 feet. With Mr. Miller leading we started climbing up a network of ill-defined trails that led us through a thick but fascinating growth of trees and shrubs. There was fruit on a wide range of plants and I collected seeds of several of the most interesting: *Stewartia koreana*, much like those in the Arboretum in habit and size, and *Rhamnella franguloides*, an uncommonly cultivated relative of cascara with cylindric fruits yellow and red then turning to black. It was truly eye opening to see the vast number of species growing in such a restricted area—in half an hour I counted thirty species of trees or shrubs and saw a number I couldn't identify. Many are considered among the best ornamentals for Seattle gardens. There were flowering cherry *(Prunus serrulata)*, several species of *Viburnum, Cornus kousa, Weigela florida*, Japanese snowbell *(Styrax japonicus)*, and two rhododendrons, *R. mucronulatum* and *R. schlippenbachii*.

Climbers of all sizes and vigor laced the forest together; we saw several grapes *(Vitis), Clematis* and the rampant kudzu *(Pueraria lobata)* scrambling over everything. We returned to our hotel after dark in time for a late dinner and a welcome rest.

Suncheon and Sunan-sa

Sunday we visited a Buddhist temple, Sunan-sa, near the city of Suncheon. We fell into a familiar pattern of visiting temples as we continued our tour, since they were usually located in highly scenic areas, often surrounded by the relics of Korea's original forests. The temples often have some cultivated plants as well so that they are worth visiting for botanical or horticultural reasons.

Sunan-sa (sa = temple) has occupied the same site for about 1400 years and consists of a series of smallish shrines and living quarters for the monks. Some buildings are very old, others much newer, all built in a style that seemed to my untrained eyes about half way between Chinese and Japanese. Most are brightly painted with blue, green, orange-red and white, often in elaborate designs. The courtyards consist largely of bare soil with groups of plants scattered

The drum of Sunan-sa, in its ornate protecting building, with a background of *Abies nephrolepis*. **Photo: J.A. Witt**

The cherished *Pinus densiflora* at Sunan-sa.
Photo: J.A. Witt

throughout. There was a *Zelkova serrata* at least four feet in diameter with a spread of well over 60 feet, a true patriarch of a tree. Beautifully shaped Japanese red pines *(Pinus densiflora)* seemed to be especially treasured. Other garden plants included camellias, irises and roses. The setting for Sunan-sa is a forest of large true firs, *Abies nephrolepis* and *Abies holophylla* (the Manchurian fir). Both species had attained considerable size and were probably over 100 years old. They did not form a pure stand but were intermixed with hackberry *(Celtis)* and hornbeam *(Carpinus)*, forming a very pleasant open forest. Lunch at a small but excellent Korean restaurant was also typical of our meals throughout the tour. It was served on a table about eighteen inches high at which one sat crosslegged. There were numerous small bowls of various prepared foods such as kimch'i (kim chee, spiced fermented cabbage), pickled taro, sweet potatoes, bean curd, onions and rice, and a dish of marinated sliced beef to be cooked at the table on a brazier. The meat, spicy and delicious, was eaten with chopsticks which most of our group learned to use in self defense.

Suncheon is the home of a National Agricultural College on the campus of which we saw a wide selection of ornamental trees and shrubs in a garden-like setting. A large specimen of Ubame oak *(Quercus phillyraeoides)* was outstanding; so was a most interesting narrowly columnar form of *Euonymus fortunei*. The latter, being propagated at the school, was most unusual and probably unavailable in the west. School officials treated us to a lemonade, most welcome since the day was warm, and they seemed very pleased to have us visit their institution. My impression was that although South Korea as a country must expend much effort to become self-sufficient, the people have not forgotten that ornamental plants have a place in their way of life.

That evening we were guests at the home of Ms. Mary Carlen, United States Information Officer for Kwangju. Her parents from Portland, Oregon (small world) were there as were other officials from the American Embassy. All adjourned to a pleasant buffet dinner at the hotel, a surprising and successful combination of western and Korean dishes.

Temples of Paekyang and Paegyang

Monday was a two-temple day. We left Kwangju by bus traveling through an agricultural valley with golden-green rice fields in the bottom lands and the farm buildings set in groves of persimmon *(Diospyros kaki)*, all decked with bright orange fruits. The first temple, Paekyang, was very modern and well maintained. A new structure was under construction where the workers were utilizing ancient building techniques but using power tools. The temple was surrounded by a mixed forest of hardwoods and conifers where the dominant trees were magnificent specimens of *Torreya nucifera*, tall and handsome with a habit somewhat like true fir. *Torreya* has an interesting distribution with species in Japan, China, California and Florida. Under a few of the trees there were ripe fruits which we collected with some difficulty only to find that the nut-like seeds were for sale at the temple's gift shop! As this site is reputed to be the most northerly location for *Torreya*, and since these were uncommonly handsome trees, we had good reason for wanting to introduce this species from this provenance.

Our next stop was to be in Naejang National Park, site of Paegyang-sa, which was a long

***Aster spathulifolius* growing in the cliffs of Ullung-do (page 6).**
Photo: J.A. Witt

drive on paved roads or a short 16 kilometers over a rough one-way track. We bounced over the unimproved road through forests of *Pinus densiflora*, down a winding but scenic canyon and arrived at the Naejang Hotel in time for lunch. A story had circulated that our road was to be driven in one direction one day and in the other the next day. We, of course, went the wrong way.

The walk from the hotel to the temple, Paegyang-sa, was memorable. The first half-mile or so was lined with trident maple *(Acer buergeranum)*, young but vigorous trees just beginning to turn red. Closer to the temple there was an avenue nearly a mile long of Japanese maple *(Acer palmatum)*. These were truly patriarchs of their kind, some easily fifty feet tall and nearly two feet thick at the base, a really unexpected size. A nearby chair-lift took us up a steep hillside to an overlook some thousand feet above the valley. Fall color up here was further advanced and the hills were covered with a marvelous tapestry of greens, yellows, oranges and reds from the deciduous trees and shrubs. Paegyang-sa was originally built in 632 A.D. but had been rebuilt several times, the last in 1917. Among the many visitors were busloads of high school aged children who, while polite, did not seem impressed with the religious aspects of the temple. That evening we visited the nearby village (which seemed to be primarily devoted to selling souvenirs) and enjoyed the cool and fresh mountain air—a welcome change from hot and dusty Kwangju.

Across the Peninsula to Kyongju

We started early the next morning for a long drive north then east across the peninsula to Kyongju. We had a pleasant stop at the Cholla Pukto Forestry Research Institute, in Chongju, where its Director, Mr. Oh Tu-hyon, was kind enough to show us the work in progress there. Among the several surprises were a well-tended and well-labeled rose garden, still flowering, and a small but respectable arboretum which included a fine male ginkgo with a narrowly oval crown. A chestnut harvest was in progress with many hundreds of pounds of shiny brown chestnuts being cleaned and bagged. These were *Castanea crenata*, the native chestnut which is widely used for food in Korea as it is in Japan.

The ride though long was not without interest. The freeway roadsides were planted with many trees and shrubs, most of the former with straw-mat bands around their trunks. The crops we could identify at 60 mph were rice, peppers (appearing as bright red patches as they dried beside the highway), tobacco, and cabbages. Ginseng *(Panax pseudo-ginseng)* was cultivated under straw-mat hutches since the plant needs nearly full shade. Apple orchards and

Avenue of *Acer buergeranum,* with hotel in background, Naejang National Park. **Photo: J.A. Witt**

occasional vineyards covered the hillsides in some locations and above these on the higher hills were plantations of *Pinus densiflora* and less commonly, of larch, poplar and *Paulownia*. The farmsteads, usually located at a distance from the fertile farmlands, nearly always had trees around the buildings. Koreans obviously love and respect their trees.

We arrived in Kyongju in the late afternoon and were settled in a vast hotel in a row of vast hotels. Kyongju is, after Seoul, the major tourist center of South Korea and is well equipped to handle visitors. It was the capital of the Silla dynasty, a Korean kingdom which reached a high level of culture in the sixth and seventh centuries. Most of the day was spent in visiting the many archeological sites and a really superb museum. We had a pleasant walk through a deciduous forest to Sokkuram grotto, where a famous statue of Buddha is carved in solid granite. The forest consisted of several species of hornbeam *(Carpinus), Sorbus alnifolia*, various species of maple and a wealth of vines and shrubs including *Euonymus, Vaccinium, Viburnum, Smilax* and *Rhododendron*. The large trees of *Carpinus*, perhaps 40 feet tall and broad-spreading, made a beautiful canopy over the forest floor and the trail to the grotto. That evening we were entertained at a Korean banquet where the guests were served by young women in traditional bright costumes.

Ullung-do

The port city of Pohang on the East or Japanese Sea was our next stop after a short drive from Kyongju. We stayed only long enough to board the steamer No. 1 Hanil Ho for a six-hour trip to the island of Ullung. This volcanic island rises sharply from the sea some 270 kilometers east of Pohang and is the home of a number of endemic plants which we hoped to see. This part of the trip was something of an adventure for us and a bit of a nightmare for Jay Kang, our tour representative from the Korean Tourist Bureau. Ullung-do is rarely visited by groups such as ours and the Korean Tourist Bureau was uncertain how we would feel about the accommodations. To add to the experience, this weekend was a large national holiday, akin to our Thanksgiving, when any Korean who could get home would do so. Actually they need not have been concerned; our inn was most ade-

The fishing fillage of Nam Yang, nestled against the cliffs of Ullung-do. View from the patrol boat cruising around the island.
Photo: J.A. Witt

Rugged volcanic terrain on Ullung-do. **Photo: J.A. Witt**

View from the harbor of the fishing village of Dodong, on Ullung-do. **Photo: J.A. Witt**

Chestnut harvest, Chongju Experiment Station (page 5). **Photo: J.A. Witt**

quate, and aside from some minor transportation difficulties and having to eat soft fried eggs with chopsticks, all went remarkably well.

Our party had been augmented by Dr. T.B. Lee, one of Korea's most eminent botanists, his son, and a plant collecting party from the Royal Botanic Garden at Kew in England (Ian Beyer, Charlie Erskine and Jill Coley). Dr. Lee has recently published a fine illustrated flora of Korea and he was of the greatest assistance both in locating unusual plants and identifying what we found.

Our explorations started with a round-the-island trip in the open mail boat which also carried passengers from one village to another. The island has almost no roads except for a highway under construction which will eventually make a complete circuit of the island. Ullung-do viewed from the sea is most spectacular. Green-clad slopes, rising steeply from blue water, are dramatically cut with deep canyons and often topped with pinnacles of rock. Somehow small farms manage to cling to the less steep slopes and fishing villages are tucked into any protected inlet. Surely an open mail boat is the finest way to see this beautiful island—provided the weather is moderate.

The most active members of our party debarked at a small port about noon to take a trail which led over the central mountain and back to Dodong, the village where we were staying, while the more prudent stayed aboard the mail boat to finish the trip by sea. (The author was recovering from a mild attack of flu and was among those who took the easy way.) The hikers had a marvelous time, saw many fine plants and arrived footsore and tired but enthusiastic, after dark. We, the boaters, spent the afternoon exploring around Dodong. The village is the center of a cuttlefish industry and many of the roof tops had drying racks for these small squid relatives. Needless to say, drying cuttlefish has a most obvious aroma and one which saturates the air. The road we took climbed up from the quay and through the village to a semi-wild area several hundred feet above. There we found two endemic maples, *Acer takesimense* and *A. okamotoanum*. Both were in fruit which we collected for the Arboretum. Other plants seen were *Persea thunbergii* (an avocado relative), *Daphniphyllum macropodum* and *Prunus takesimensis*, which resembles the Japanese *P. serrulata*. At low to middle elevations there was a mixture of broad-leaved evergreens and

deciduous material indicating a cool temperate climate not unlike our coast.

Another trip was made on the Ullung-do police patrol boat since the mail boat was not running because of the holiday. We debarked at the village of Taeha, hiked up a small river past several farms with rice the main crop and began a steeper climb past one last farm of mud walls and thatched roofs. Brown cows stood complacently in the front yard by the manure pile, but a TV aerial rose from the roof. Our trail led up through rough abandoned fields with a wide range of shrubs and small trees including once again the two endemic maples. *Castanea crenata* was common and there were several asters and other composites which Dr. Lee identified as being endemic. We reached an elevation of perhaps 600 m (2200 feet) and found an endemic beech *(Fagus multinervis)* growing among Japanese hemlock *(Tsuga sieboldii).* This appeared to be undisturbed forest. There were beechnuts on a *Fagus* near the trail but we were able to collect just a few since the track was following a narrow ridge with a very sharp drop on both sides. Naturally, most of the nuts were on the side of the tree hanging over the two-hundred-meter drop. We finally descended to cultivated lands, again in a small river valley, and passed fields of maize and of peppers and of beautiful *Platycodon* (balloon flower, a *Campanula* relative), in full flower. The large open bells, mostly white but occasionally blue, were a most attractive sight. Its root is picked and used as a relish. Our hike was only about seven kilometers (four and a half miles) long but because of the altitude gained we saw a wide range of plants. Some of the more outstanding were a large dogwood with red fruits *(Cornus controversa), Aucuba japonica,* marlberry *(Ardisia japonica)* growing as a ground cover, several species of *Smilax*, the Japanese yew *(Taxus cuspidata)*, a small-sized linden *(Tilia insularis)*, an alder *(Alnus maximowiczii)*, and *Neolitsea sericea*, a fine broad-leaved evergreen small tree with red-black fruits. Namyang, our destination, was another fishing village of several hundred people who were quite surprised to see a large group of westerners descending from the mountain but were polite and helpful. We had been expected by the local police who joined us enjoying the gravel beach in the late afternoon sun while we waited for the boat to take us back to Dodong.

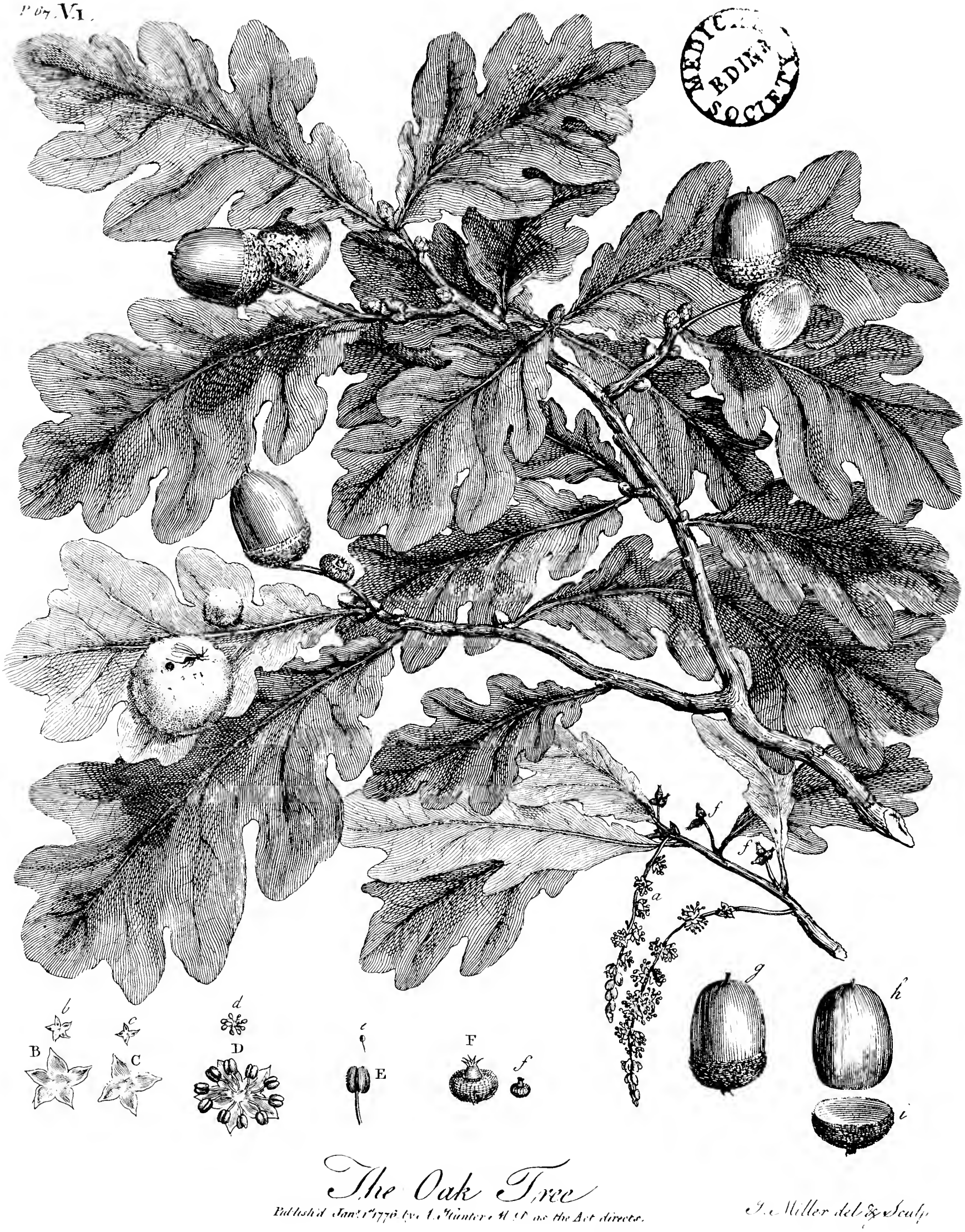
Just a word about the food—lunches on the trail consisted of roasted chestnuts and seaweed-wrapped rolls of sticky rice with a pickle or sausage or bit of fish in the center. Breakfast was North American: fried eggs and toast and jam! Dinners were typically Korean, either beef slices cooked at the table, or a whole fish, and the usual range of side dishes which included kimch'i and rice. Our hotel rooms were small but comfortable, the furnishings consisting of the pile of bedding and mats for sleeping and the table for the TV. Most had a bath but hot water only in the morning.

Ullung-do is probably not going to remain isolated and traditional; it is much too beautiful and interesting and in time will certainly draw as many tourists as Cheju-do.

We sailed back to the mainland on No. 1 Hanil Ho over a sunny and warm sea, and six hours later were meeting our bus in Pohan.

(to be continued)

Our group leaving the village of Taeha and its surrounding rice farms. Photo: J.A. Witt



The majestic English Oak, *Quercus robur.* **from John Evelyn's *Sylva, or a Discourse of Forest Trees,* 1776**

Five Oaks:
Seattle's Four Common Exotic Oaks and Its Rare Native One

*ARTHUR LEE JACOBSON**

Editor's Note: The genus Quercus *is generally divided into two sections; red (or black) oaks and white oaks. Red oaks have bristle-tips to the leaf lobes, and generally inedible acorns requiring two years to mature. These include* Quercus palustris, Q. rubra *and* Q. coccinea. *White oaks have blunt edges to the leaf lobes and acorns that mature in one year. In some species the acorns are sweet and edible.* Quercus garryana, *our native oak, bears considerable resemblance to* Q. robur *in general outline and shape of leaf and acorn, but is very distinct in the stout hairy shoots and large downy winter buds. Douglas named it after Nicholas Garry of the Hudson's Bay Company, who greatly assisted him in his early journeys (Bean, 1981).*

While there are several hundred species of oak, and a multitude of hybrids, Seattle is dominated by four common kinds. These common introduced oaks and our native Oregon white oak will be featured here to the exclusion of the various rarer sorts.

Introduced Oaks

English oak *(Quercus robur),* a white oak, is the most abundant oak in the city's older parks, including Washington Park Arboretum. Almost every park landscaped by the Olmsted brothers has this. Today, although it is rarely planted, it plants itself, reproducing rampantly in our parks and verily wherever it is able; seedlings and saplings abound. In the Arboretum one can observe many sapling English oaks tenaciously holding their rich green leaves as late as mid-November—long after the other oaks have turned color. This species owes its successful reproduction to three factors: its abundance, its regularly-set crops of large acorns and its relatively strong shade-tolerance.

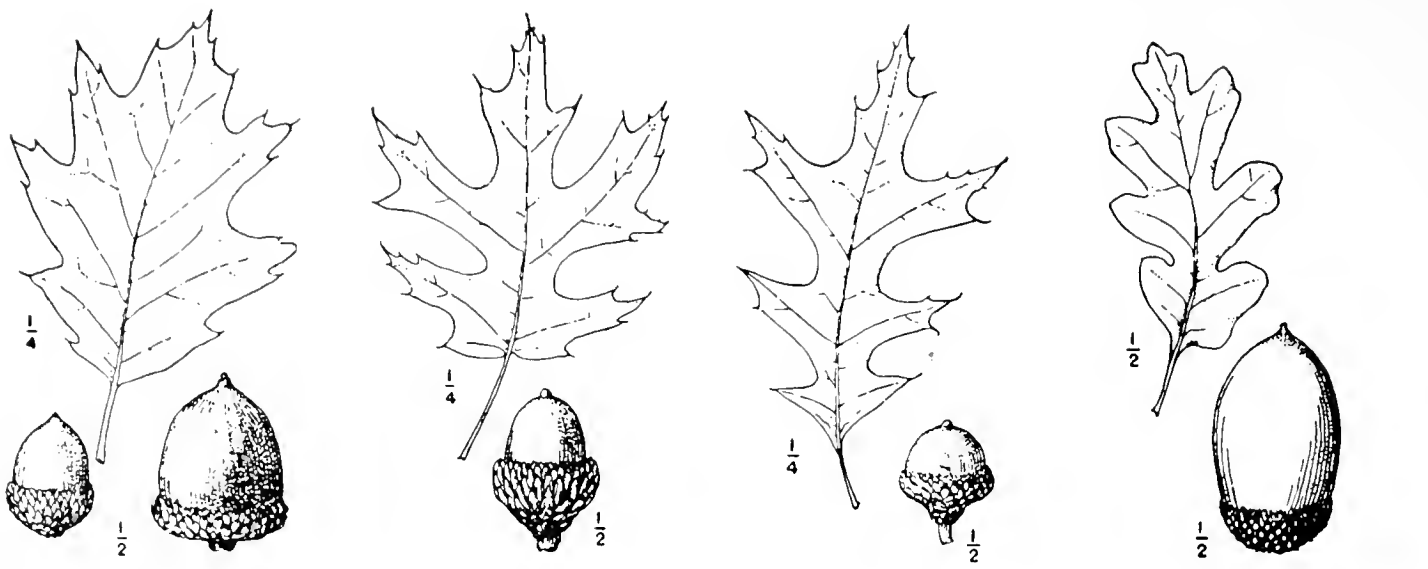
When given full sun the tree flourishes, developing a broad crown and massive trunk. One on Kinnear bluff, planted in the 1890's, has a diameter of over three feet. When shaded in thick woods as in Interlaken Park, a skinny trunk shoots up like a telephone pole 75 or more feet high, with few limbs near the ground. In Europe where it is native, the largest specimens achieve 150 feet and generally unequalled girth. Centuries-old trees are much venerated by the people there.

Of all the trees on earth, few have been more celebrated and worshipped, or have played a more active role in human history. This is THE tree of the British, monarch of that forested isle; with its timber were built the sturdy ships that helped to establish an empire. No tree is more mentioned in English poetry, song, and literature. But it is not only the British who are fond of the tree; something about the oak makes us all revere and admire it, as expressed by Virgil in his second Georgic, in Dryden's famous translation:

Jove's own tree,
That holds the woods in awful sovereignty,
Requires a depth of lodging in the ground,
And, next the lower skies, a bed profound.
High as his topmost boughs to heaven ascend,
So low his roots to hell's dominion tend;
Therefore nor winds, nor winter's rage, o'erthrows
His bulky body, but unmoved he grows.
For length of ages lasts his happy reign,
And lives of mortal men contend in vain.
Full in the midst of his own strength he stands,
Stretching his brawny arms, and leafy hands:
His shade protects the plains, his head the hills commands.

Pin oak *(Quercus palustris),* a red oak, was little used in the Olmsted-designed parks, but has been very widely used since then, especially

*Arthur Lee Jacobson is interested in the large trees of Seattle (*Arboretum Bulletin* 45(4): 13-19, Winter 1982) and has in progress a book concerning the trees in town.



91. Northern red oak. 92. Scarlet oak. 94. Pin oak. 163. Oregon white oak.

from *Trees, The Yearbook of Agriculture 1949,* United States Department of Agriculture

as a street tree. It is aptly called pin oak; in every respect the trees are distinctly skinny: a slender straight trunk, numerous slim, elongated drooping branches and pin-like twigs bearing finely cut leaves with spined lobes.

As the trees mature they can take on a bristling appearance from the fiercely clinging twigs and branches, best observed in old, unpruned trees. Four such can be seen in the Arboretum near the boulevard midway between Boyer Avenue and the viaduct overpass. Most of the pin oaks in this region never approach the twiggy density of the Arboretum group. One of the biggest pin oaks in the city is literally surrounded by a pigsty at the zoo, but protected from the pig. The tree is somewhat atypical in appearance.

Pin oaks are popular due to their pleasing outline, bright fall color, ease of transplanting and rapidity of growth. The young trees, as with many other oak species, tend to hold their leaves throughout the winter, brown and dead but still attractive, until the swelling buds of spring pop them to the ground. This feature is less marked on busy arterial streets than on quiet residential ones. Acorns are produced in abundance, but seedlings are uncommon in Seattle. There is, however, a definite problem associated with the pin oaks: their habit of forever thrusting their long skinny limbs into everyone's way. In spite of pruning, the branches will continue to grow; prune one, the next one up begins to droop; cut the tree down and the stump will send up suckers. Certain cultivars such as 'Crownright' need less pruning.

Red oak *(Quercus rubra)* is the opposite of the pin oak in every respect except rapidity of growth. It is a massive tree, with a short stout trunk that quickly forks into gigantic, sturdy limbs, which spread into a very broad crown. The leaves are huge and wide, but shallowly lobed. Native in the eastern United States like the pin oak, it grows on better soils and can achieve a maximum height of 160 feet with a trunk sometimes more than eight feet in diameter. One of Seattle's finest specimens is on the lawn northwest of Savery Hall, on the University of Washington campus. It is commonly seen in parks and in the gardens of old mansions, but is far too large for most street planting strips and thus is scarcely seen as a street tree. The acorns are large and seedlings not uncommon.

Scarlet oak *(Quercus coccinea)* is intermediate in appearance between the pin and red oaks. Where the pin oak is thin and twiggy and the red oak is gargantuan, the scarlet oak seeks the prudent middle ground. It takes after the red oak in trunk habit, and after the pin oak in leaf shape. The Arboretum has exemplary ones near the Lynn Street parking lot. They were planted in 1938, and are labelled. The Federal Courthouse downtown has twenty of these on its spacious lawn, as well as some pin oaks.

The Native Garry Oak

Having considered the four fairly abundant exotic oaks in Seattle, we now turn to our decidedly rare native species, the Oregon white or Garry oak *(Quercus garryana)*. It is able to survive in exposed, dry, miserably parched areas such as the vicinity of Victoria, British Columbia, and in these places is a slow-growing tree. In Seattle the only *wild* ones of any significant size and age appear to be limited to the Seward Park area, where a combination of well-draining soil

and strong southern exposure makes for a habitat that few trees can tolerate.[1] Cultivated specimens are found throughout the city, and usually appear to be sturdy, carefree trees.

The Oregon white oak is a distinctive species, having very stout twigs terminating in large hairy buds, and leaves of a heavy texture, dark green and rough above, pale and downy beneath, with irregular rounded lobes. The only oak in Seattle that one might mistake for it is the English oak *(Quercus robur).*

This tree suffers from a widely-held myth that it is always a very slow grower. Where it grows naturally it is usually slow, but when cultivated in Seattle it is by no means our slowest-growing oak. When it receives ample moisture and rich soil, it makes a superb street tree. Two can be seen as such where E. Ward Street meets 26th Avenue E., very close to the Arboretum, and one on Harvard Avenue between Harrison and Republican.

An interesting aspect of the tree is its gall production. Galls are swellings of plant tissue generally caused by insects, to give a home for their brood. In our area galls are easily observed on willow, poplar, spruce, linden, box, kinnikinnik and rosaceous shrubs. One type of gall on the native oak fairly shouts for attention: it is large and buff colored, from two to four inches in diameter, round or nearly so, occurring singly or in clusters. These galls would make fine fish floats or could be used admirably in arrrangements of dried plant material; when young and tender they are edible, although astringent if eaten raw. The Oregon oak gall wasp *(Andricus spongiolus)* is the insect instigator of this particular type of curious vegetable ball. For some reason, certain trees are galled and other left alone.

In closing I urge all people interested in specimen trees to make a visit to see the splendid Oregon white oak at the Oak Manor apartments, 730 Belmont Avenue E., on Capitol Hill. It is one of the most outstanding specimen trees of any kind in the city. Fred Anhalt, local architect and builder who has produced many acclaimed buildings in town, including these, responded to my inquiry about the old oak. "When I built the apartment building in 1928 the tree was about one half of the size that it is now. How old it would have been then I cannot tell you. The tree has doubled its size in width and also in height since 1928. It has been protected with a fence around it and with no other plants under it. It has received the same care as any other plants and trees planted at that time."

[1]See "Ancient Madrona and a Stand of Garry Oaks in Seattle," by J.A. Witt, *Arboretum Bulletin* 42(1): 8-10, Spring 1979.

Book Reviews

ARBORICULTURE—CARE OF TREES, SHRUBS, AND VINES IN THE LANDSCAPE, by Dr. Richard Harris. Prentice - Hall, Inc., Englewood Cliffs, New Jersey, 1983. 688 pages, 300 black and white photographs, 125 line drawings, numerous tables, one map, seven appendices, bibliography, index. Hardcover, price $36.95.

I was eagerly anticipating the publication of *Arboriculture—Care of Trees, Shrubs and Vines in the Landscape* by Richard Harris for a number of reasons. First, I had had the good fortune of owning a copy of Dr. Harris' course syllabus, upon which the book is based, and knew that the book would be an excellent resource. Second, I was scheduled to teach a class in landscape plant management, a subject area for which I had not found an adequate text. After seeing the published book, I've no doubts that the book will become both an authoritative reference work as well as a popular textbook in the areas of plant management and arboriculture. With over 20 years of professional experience, Dick Harris is highly qualified to fulfill those two roles.

While the book is written in textbook style, it can also be a welcome addition to the library of the professional or amateur gardener. Not only does it review the practices and procedures for the care of woody plants but it discusses why a given procedure is used. Thus, much of the mystery is taken out of woody plant care and the scientific principles are emphasized. For someone interested in analyzing a situation or problem, this type of information can be invaluable.

Arboriculture—Care of Trees, Shrubs and Vines in the Landscape is composed of 21 chapters which can be divided into 4 major sections. The first covers some basics about plant growth, plant selection, climate, and soil as well as examines how those basics can be applied to plant care. The second section covers installation of plant material and ranges in topic from protecting existing trees to planting on extreme sites. The third reviews the after-planting care procedures for woody plants. Chapters cover: fertilization, irrigation, soil management, pruning, chemical control of growth, and preventative maintenance and repair. A fourth section covers the general topic of plant problems and includes diagnosis, noninfectious disorders, diseases, insects, and pest management. Finally, Dr. Harris has provided seven appendices. These include

plant lists for flood and land-fill tolerant plants, as well as the times of foliation and defoliation of a number of tree species.

Perhaps the best comment I can make on this book is that since its arrival to my desk, there have been few days when I have not used it. As a reference or manual, *Arboriculture—Care of Trees, Shrubs and Vines in the Landscape,* is an impressive volume.

DR. JAMES R. CLARK
Center for Urban Horticulture

Since this book is written in textbook style, we recommend that any gardener interested in purchasing it first examine the copy in the Arboretum Library.

THE KING'S GARDEN, by Marguerite Duval, translated by Annette Tomarken and Claudine Cowen. University Press of Virginia, Charlottesville, 1982. 214 pages; 29 black and white illustrations of plants, people and places; index to plant names. Hardcover; price $14.95.

Readers! Be prepared for a unique reading experience. The content of this book spans three centuries of plant exploration: originally published in 1977 as *La Planete des Fleurs,* this volume makes a real contribution to a sadly neglected phase of history—that of botanical exploration. Botanists, especially the French, have searched the world for useful and decorative plants. These plant expeditions largely took place under the auspices of the French kings, and for over three hundred years France dominated this field. Their curiosity aroused, traveling-botanists (as they were then called) set sail to the Antipodes, to South America, to the Orient—even to Canada. Naturalists of renown dared to travel to the then unknown lands: Humboldt and Bonpland to South America, Jacquemont to Asia.

Many of the treasures found in far-flung places brought important changes to Westen civilization. Consider the significance of the finding of the quinine-bearing cinchona tree *(Cinchona officinalis).* It reached France in 1678 and was used successfully to curb fever and to aid in the control of malaria. Think of the impact of the ordinary potato, tomato, pepper and corn—all brought back successfully from South America. Add to these almonds from the Mediterranean and Brazil nuts and Oriental chestnuts.

In the first chapter the author poses the query: why did the idea of plant exploring not spread before the sixteenth century? Going to find plants where they grow seems such a natural thing. But travelers were preoccupied with religious matters, and it took the Crusades and other ventures to awaken Europeans to the possibilities of what might be outside their own boundaries. Furthermore, it took a legion of missionaries to make travel routes usable.

There is always a small beginning to a major accomplishment. Among names in early botany was that of Dioscorides, who put forward an idea that astonished early botanists. He said that if you wish to understand the life of plants, you have to observe then *in situ;* dead flowers will not do . This idea opened unknown horizons. Galen, student of medicine, urged scientists to travel to far-flung places. He felt that correct descriptions of plants can only be made before living shrubs and trees.

Pierre Belon was the first botanist-traveller from France. He was born in the province of Maine, France in 1517, and lived at a major turning point of botanic history. From his extensive travels he brought back countless plant treasures. He had seen the famous roses of Jericho, the larkspur on Mount Ida *(Delphinium ajacis* or *Consolida orientalis),* hellebores, acacias, myrtles, rock roses *(Cistus)* and mighty cedars. What a daring feat of accomplishment! He also acquired seeds from Italy, among them seeds of the olive tree *(Olea europaea),* the plane tree *(Platanus orientalis)* and the oleander *(Nerium oleander).* He brought back the cherry laurel from Tuscany, acorns of the cork oak from near Sienna and the Christmas rose from the Bergamo area. But the specimens he brought back often did not survive transporting. Nonetheless, Belon takes his place as a real pioneer in the field of arboriculture.

King Henry IV entered Paris to be crowned in 1594. The idea of a King's Garden dates to this event. Until then only herbs and medicinal plants had been grown. To grow economically important exotic specimens one always had to meet the problem of how to enable them to endure. A coffee seedling from Leyden provided the answer. A small glass house large enough for a shrub was built for it. The seedling survived! Thus greenhouses were born. Tropical plants could now come to France; the King's Garden received its first Chinese delphinium *(Delphinium grandiflorum)* and tea *(Camellia sinensis).*

By now the efforts of many French botanic travelers, who had combed the world for plant treasures, were changing direction. They had reached a pinnacle of perfection in the King's Garden. There geometric beds in a classic design were arranged. An orangerie contained orange and lemon trees from the Orient. But soon the King, with a broader perspective, looked to further plant exploration. Witness the return of a botanist, Flacourt, from Madagascar. He returned with several species of orchids, and also brought back tobacco, jasmine, raffia palms and hibiscus. The French court's passion for flowers was realized.

Among the seventeenth century missionaries was Father Dominique Parennin who accompanied the Emperor of France to Manchuria. He it was who sent back to Europe the wisteria *(Wisteria sinensis).* Later he found the Chinese pink *(Dianthus chinensis)* and the China aster *(Callistephus chinensis).* The King's Garden received the first Chinese delphinium (the perennial *Delphinium grandiflorum),* the first Chinese rhododendrons and "Asian jasmine" *(Jasminum officinale).* More fabulous plants included the spindle tree *(Euonymus),* the forsythia, the gardenia and the camellia. Both at the French court and in the King's Garden these plants received great acclaim.

More wondrous things were accomplished but this brief review can only hint of them. I have been amazed and challenged by this scholarly writing. It is a work of substantial content; it takes time to digest it!

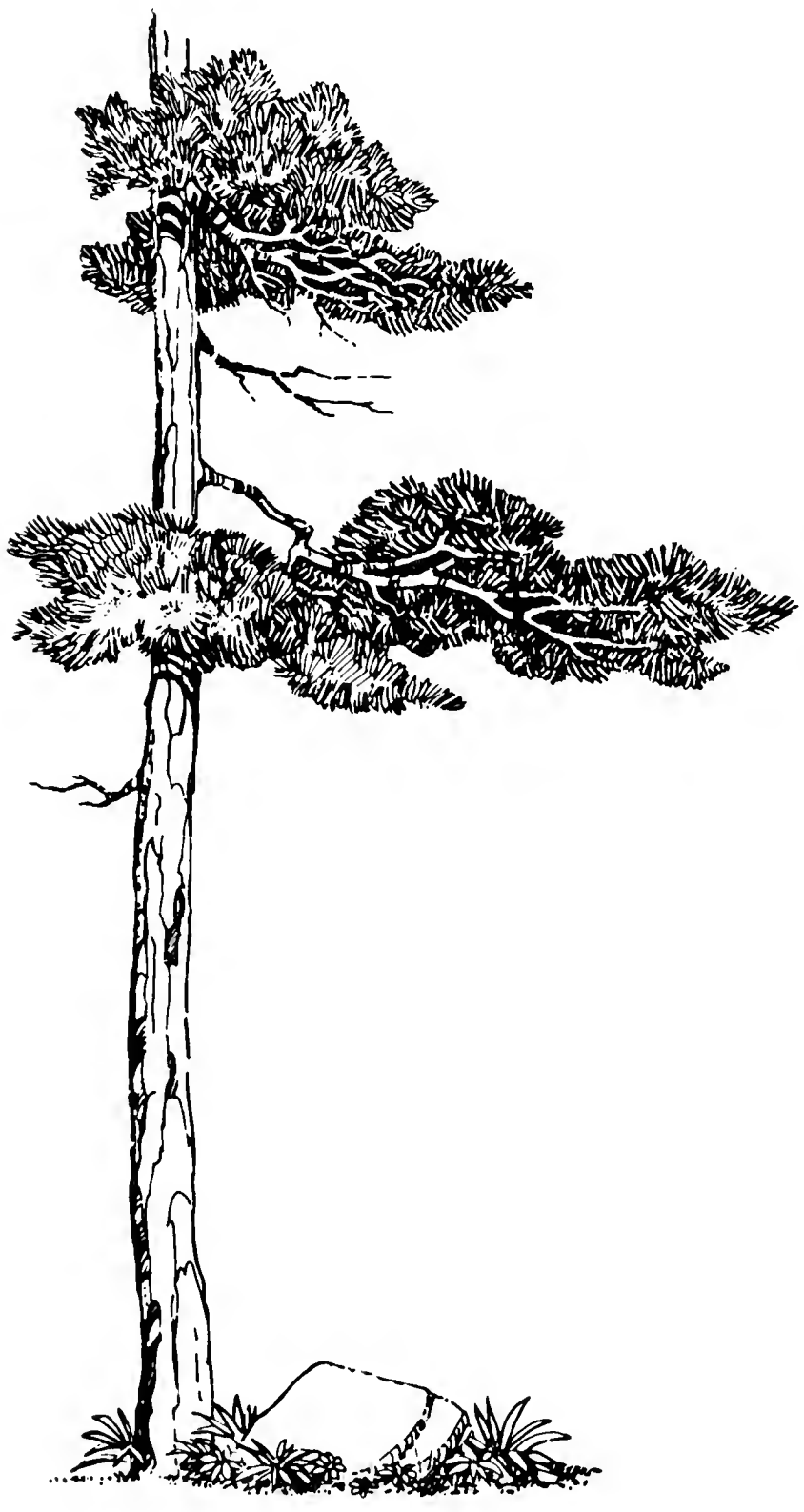
ROSAMUND P. ENGLE

Editor's Note: This interesting volume, while clearly describing the history of botanical exploration originating from France, is written from the perspective of the French and is not intended to be an exhaustive survey of the botanical exploration or horticultlural contributions of other European nations.

In Praise of Wildness

LESLIE R. NORTON

A Camp Fire Girl on a nature walk on my woods path said, "Mrs. Norton, I don't see how you take care of all this." The woodland seemed to her a well-tended garden, as indeed, in certain ways, it is. Even some of the objectives of good garden planning can be seen. There is a theme—in this case a small ecosystem—and there are variations—a succession of vistas and surprises. The plants are not in a jumble, but seem rather carefully placed in situations suitable to the needs of each.



There is a sense of peace and accommodation in my piece of undisturbed woodland. The plants thrive, as new arrivals that do not are soon eliminated. While there are many sword ferns, they are not crowded, but are comfortably and fairly evenly spaced. Star flower has its own little areas beneath hemlocks, and is not scattered at random. Wild ginger spreads slowly from one side of the path to a new home beneath devil's club, on the other. Foam flower finds its niche on moss-covered nurse logs.

Though we have not done the planning, we sense that there is a plan or system at work, as in fact there is, one more finely turned than any we could devise. A knowledge of some of the ways of seed dispersal hints of this system. What we know of replication by rhizomes tells us more. Observations of seasonal changes of light through the forest canopy, and of variations in soil and of ground water give further clues. It is no accident that skunk cabbages grow only around the spring. The more details we see and understand, the clearer becomes the plan.

In our gardens of exotic plants, we must take deliberate measures of control, both in layout and in maintenance, as here we are contravening natural processes of which we know very little. In these gardens we create work for ourselves in planting, cultivating and pruning (though it's our pleasure), and problems with weeds, insects and slugs (which can be vexations).

Perhaps in wild places we feel more than in any other a sense of affinity with earth's natural processes, of which we too are a part, and of which we carry a long deep inner memory imbedded in our very genes. Perhaps it is because of this old earth-life memory that in natural woodlands, blooming deserts and seashores rich with life, our spirits are moved in mysterious ways, and we find refreshment.

The Butterfly's World
Notes of a Butterfly Gardener

*SHARON J. COLLMAN**

It seemed quite simple really: plant an abundance of flowers and the butterfly garden is created... or is it? Two years after embarking on a study of butterfly gardening, I find I have more questions than when I first began. Perhaps this year more of my questions will be answered.

The World of Urbs and Suburbs

Houses, pavement, decks, lawns, shopping centers and highways are familiar sights in urban and suburban areas. Beyond the urban centers, large farms are divided into small farms and small farms divided into five-acre lots, which are divided into one-acre lots. Regardless of the size of the parcel, the new tenants conquer their lands with zeal, reducing or eliminating the wild areas and thus the "weeds" that support a myriad of wee beasties—beetles, flies, bees, spiders and butterflies. In urban areas many of the formerly vacant lots have disappeared in recent years.

In 1946 Ben V. Leighton published an inventory of the butterflies of Washington. At that time 47 species and 22 subspecies or varieties of butterflies had been collected or recorded from the lowlands (Seattle, Renton, Bellevue, Bothell, etc.) of King County. Today the Evergreen Aurelians (chief researchers of the Pacific Northwest Butterfly Survey) estimate that only 26 species are likely to be encountered, and these in low numbers (See Table 1).

There is no mystery behind the loss of local butterflies. In the process of settling the land we have destroyed their wild habitats and food plants. If the few remaining butterflies take refuge in our gardens, and are encountered in their caterpillar stage, they are promptly "dispatched". Others perish along with other insects when yards or other areas are needlessly sprayed with pesticides[1].

Survivors of Urbanization

A few butterflies still manage to survive in urbanized areas. Some plants such as bitter cherry, Douglas fir, willow and dogwood stand as remnants of wilder times. The large yellow-and-black western tiger swallowtail is a delight and in some years is even abundant. Pine whites, skippers, and mourning cloaks are also rather common. Where fennel *(Foeniculum vulgare)* has escaped to untamed areas, the anise swallowtail is found. And the cabbage white is successful enough to be considered a pest in vegetable gardens, though it is often unjustly blamed for damage done by the cabbage looper, whose green caterpillar is similar but whose moth stage goes unnoticed.

Like ourselves, butterflies have a "lifestyle" to which they have become accustomed. I suspect they are most put out by our urbanizing ways. In disgust they refuse to grace our grounds unless we provide the amenities to maintain their interest. A garden of flowers can be a welcome oasis for a butterfly flitting through the urban landscape. The butterfly may stop to feed, then move on in search of food plants for her young. The well-furnished butterfly garden will provide for all the needs of butterflies.

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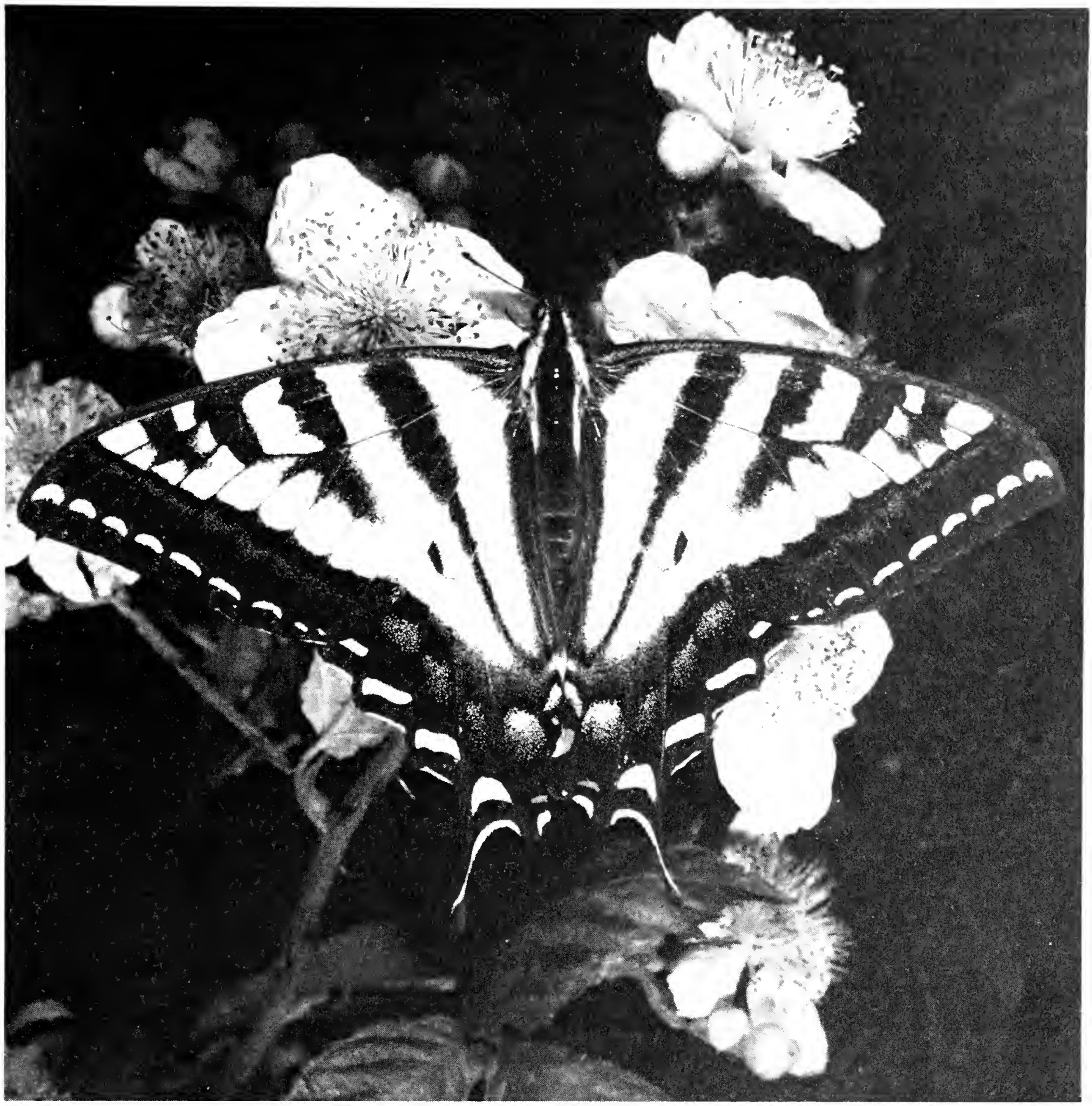
*Sharon J. Collman is a native of Seattle. Her fascination with insects began at an early age and she continues to study the little beasts. After receiving her M.S. from the University of Washington College of Forest Resources she joined the faculty of Washington State University in 1974 as a King County Extension agent.

[1] Some tree services and arborists are offering consulting services or integrated pest management programs where only plants with problems are treated with pesticides as needed. These businesses often must contend with clients who are afraid that they "aren't getting their money's worth" unless the entire yard is sprayed.



Western tiger swallowtail *(Papilio rutulus)* perching on blackberry. **Photo: Tom Boyden**

Table 1. THE BUTTERFLIES OF LOWLAND KING COUNTY

Swallowtails and Parnassians (Papilionidae)	
Western tiger swallowtail	*Papilio rutulus*
Anise swallowtail	*Papilio zelicaon*
Clodius parnassian	*Parnassius clodius*
Whites and Sulfurs (Pieridae)	
Pine white	*Neophasia menapia*
Cabbage white	*Artogeia rapae*
Veined white	*Artogeia napi*
Sara orangetip	*Anthocharis sara*
Hairstreaks, Elfins, Coppers and Blues (Lycaenidae)	
Brown elfin	*Incisalia augustinus*
Gray hairstreak	*Strymon melinus*
Nelson's hairstreak	*Mitoura nelsoni*
Purplish copper	*Epidemia helloides*
Silvery blue	*Glaucopsyche lygdamus*
Spring azure	*Celastrina ladon*
Brushfooted Butterflies (Nymphalidae)	
Lorquin's admiral	*Basilarchia lorquini*
Red admiral	*Vanessa atalanta*
Painted lady	*Vanessa cardui*
West coast lady	*Vanessa annabella*
Mourning cloak	*Nymphalis antiopa*
California tortoiseshell	*Nymphalis californica*
Milbert's tortoiseshell	*Aglais milberti*
Satyr anglewing	*Polygonia satyrus*
Faunus anglewing	*Polygonia faunus*
Mylitta crescentspot	*Phyciodes mylitta*
Ringlets, Wood Nymphs, Arctics and Alpines (Satyridae)	
Ocher Ringlet	*Coenonympha tullia*
Skippers (Hesperiidae)	
Woodland skipper	*Ochlodes sylvanoides*
Silver-spotted skipper	*Epargyreus clarus*

Table 2: FOOD PLANTS FOR LARVAE OF BUTTERFLIES OF LOWLAND KING COUNTY

Clodius Parnassian	Bleeding heart *(Dicentra formosa)*
Anise Swallowtail	Seacoast angelica *(Angelica lucida)*
	Fennel *(Foeniculum vulgare)*
	Caraway *(Carum carvi)*
	Cow-parsnip *(Heracleum lanatum)*
	Desert parsley *(Lomatium)*
	Carrot *(Daucus carota* var. *sativa)*
	Parsley *(Petroselinum crispum)*
W. Tiger Swallowtail	Aspen, Poplar *(Populus)*
	Maple *(Acer)*
	Willow *(Salix)*
	Elm *(Ulmus)*
	Alder *(Alnus)*
	Sycamore *(Platanus)*
	Cherry *(Prunus)*
Pine White	Pine *(Pinus)*
	True fir *(Abies)*
	Douglas-fir *(Pseudotsuga)*
Veined White	Crucifers: Pennycress, Rockcress, Wintercress, *(Thlaspi, Arabis, Barbarea)*
Cabbage White	Crucifers: members of the cabbage family, (Brassicaceae) esp. cabbage
Sara's Orange Tip	Nasturtium *(Tropaeolum)*
	Crucifers (Brassicaceae)
	Money plant *(Lunaria)*
Brown Elfin (larva does not eat leaves)	Buckthorn *(Ceanothus)*
	Blueberry *(Vaccinium)*
	Azalea *(Rhododendron)*
	Salal *(Gaultheria)*
	Stonecrop *(Sedum)*
	Apple *(Malus)*
	Madrona *(Arbutus)*
Gray Hairstreak	Corn *(Zea mays)*
	Oak *(Quercus)*
	Strawberry *(Fragaria)*
	Mints (Lamiaceae, formerly Labiatae)
	Legumes (Fabaceae, formerly Leguminosae)
	Mallows (Malvaceae)
Nelson's Hairstreak	Incense cedar *(Calocedrus decurrens)*
	Western red cedar (Thuja plicata)
	Cypress family (Cupressaceae)
Purplish Copper	Dock, Sorrel *(Rumex)*
	Knotweed *(Polygonum)*
	Cinquefoil *(Potentilla)*
Spring Azure (larva does not eat leaves)	Dogwood *(Cornus)*
	Viburnum *(Viburnum)*
	Buckthorn (Ceanothus)
	Blueberry *(Vaccinium)*
	Azalea *(Rhododendron)*
	Salal *(Gaultheria)*
	Stonecrop *(Sedum)*
	Apple *(Malus)*
	Madrona *(Arbutus)*
Silvery Blue	Lupine *(Lupinus)*
	Wild pea *(Lathyrus)*
	Vetch *(Vicia)*
Mylitta Crescent Spot	Thistles *(Cirsium, Silybum, Carduus)*
Satyr Anglewing	Stinging nettles *(Urtica)*
	Elm *(Ulmus)*
Faunus Anglewing	Birch *(Betula)*
	Alder *(Alnus)*
	Willow *(Salix)*
	Gooseberry, Currant *(Ribes)*
	Wild rhododendron *(Rhododendron)*
California Tortoiseshell	Buckthorn *(Ceanothus)*
	other shrubs and trees
Milbert's Tortoiseshell	Stinging nettle *(Urtica)*
Mourning Cloak	Willow *(Salix)*
	Elm *(Ulmus)*
Painted Lady	Thistle *(Cirsium* preferred)
	Mallows (Malvaceae)
West Coast Painted Lady	Mallows (Malvaceae)
	Cheeseweed *(Malva parviflora)*
	Sidalceas *(Sidalcea)*
	Hollyhocks *(Alcea,* formerly *Althaea)*
	Stinging nettle *(Urtica)*
Red Admiral	Stinging nettle *(Urtica)*
Lorquin's Admiral	Apple *(Malus)*
	Willow *(Salix)*
	Poplar, Cottonwood *(Populus)*
	Cherry *(Prunus)*
	Meadowsweet *(Spiraea)*
Ocher Ringlet	Unknown, probably grasses (Poaceae)
Woodland Skipper	Grasses (Poaceae)
Silver-spotted Skipper	Black locust *(Robinia)*

Strikingly marked caterpillar of the anise swallowtail clinging to a slender stalk of a plant in the parsley family. The three pairs of true legs of this insect occur near the head, while the five pairs of fat prolegs, furnished with tiny curved hooks, are adapted for gripping. Photo: S.J. Collman

Besides the nectar and food plants, other necessities include brush or grasses for shelter, perches from which to spot passing potential mates, and mud to provide needed mineral ions. Some species even enjoy a bit of rotting fruit or animal droppings. Sunny spaces are also essential since, in order to fly, a butterfly must capture the sun's rays to bring its thoracic (mid-section) temperature to at least 81°F (Douglas, 1979).

The beginning butterfly gardener may wish to add herbs or other flowering annuals or perennials to an existing garden and just observe the butterflies that are present already. The somewhat more advanced lepidopterophile will select a few larval food plants (for the caterpillars) and adopt a policy of careful use of insecticides when insecticides are necessary. Some people may become sufficiently interested to learn to recognize common butterflies, to record observations, or to pursue their subjects with camera in hand. You know you are "hooked" when you transplant nettles and thistles *into* your garden for admirals, tortoiseshells, anglewings and painted ladies.

Food Plants for Larvae

Since the prime directive for a butterfly is to lay eggs and insure continuation of her kind, the availability of larval food plants is the most important factor in establishing a butterfly garden. Each species of butterfly has preferred food plants (see Table 2). Many prefer plants which the gardener would label as weeds and spend uncounted dollars and hours on to exterminate: nettles, thistles, burdock, grasses, and mustards. Other butterfly larvae feed on plants the gardener loves and on which he or she would spend uncounted dollars and hours in the extermination of any caterpillar daring to damage its leaves.

It is reassuring to know that many butterflies lay their eggs singly or scattered among host plants so that their caterpillars are seldom serious pests. Parasites and predators also limit the numbers of butterflies. I recall my excitement at seeing a Western tiger swallowtail lay a green pearl-shaped egg on a *Buddleia*. For days I watched and soon the egg hatched into a small, black caterpillar that looked like a bit of dirt on the leaf. But *Buddleia* is not a suitable host plant for swallowtails, and in the wild such an error can be fatal. The litte caterpillar disappeared. Whether it starved, was carried away by ants or just fell off its leaf will never be known.

To have butterflies,one must accept the fact that the caterpillars will eat some leaves. In most cases the plant will not be harmed. If one should be lucky enough to have too many caterpillars, they can be shared with a friend. The most difficult task will be in distinguishing butterfly caterpillars from moth caterpillars. Cutworms and other moth larvae can be quite devastating in the garden. But with only 25 or so butterfly species in the Puget Sound area and the help of a field guide, one could soon learn to recognize most of the butterfly larvae. Occasionally, all conditions will be favorable for a particular kind of butterfly and it may become so numerous that it will be, or seem to be, a pest. When this happens the situation must be carefully assessed: are the butterflies at the beginning or end of the caterpillar (damaging) stage? is the plant otherwise healthy and able to tolerate some damage? (can

Spiny elm caterpillar, larva of the mourning cloak *(Nymphalis antiopa)*, on willow. Photo: S.J. Collman

The splendid Lorquin's admiral, *Basilarchia lorquini*.
Photo: S.J. Collman

you tolerate some damage?) are the larvae parasitized? can some of the larvae be moved to other plants or gardens? is it worth it to you to go to the trouble?

Nectar Plants

The butterfly is a transformed creature. Emerging from the chrysalis (the resting stage between larva and adult), it is no longer a crawling, chewing beast despised by gardeners. Suddenly it is a colorful, winged creature gliding through the garden, and stopping only to sip liquids. The long proboscis is coiled and out of the way until suitable liquid refreshment (juices from rotting fruit, droppings, honeydew, sap or nectar) is found. The proboscis then is extended for feeding. The butterfly moves from flower to flower and can be seen probing and sipping.

Color and/or fragrance play an important role in getting a butterfly's attention as it searches for food. Researchers investigating butterfly reactions to color and odor found that various species or groups responded to certain colors (blues, yellows, reds, ultraviolet) while others seemed to have no color preference. For example, the mourning cloak butterfly "had no spontaneous preference for any color compared to gray" (Proctor and Yeo, 1972). Other observers have noted that *Pieris* (now *Artogeia)* "visited many purple, violet and white flowers but no yellow ones. . . while the painted lady *(Vanessa cardui)* invariably visited only violet and purple flowers." Meeuse (1961) states that "whites and swallowtails see red as color, nymphalids don't."

Many of the best butterfly plants *(Buddleia,* lilac, carnations and *Ligustrum)* are also extremely fragrant. To quote Meeuse again "A wonderful plant to attract these early birds (overwintering mourning cloaks and tortoiseshells) is *Daphne mezereum. . .*"

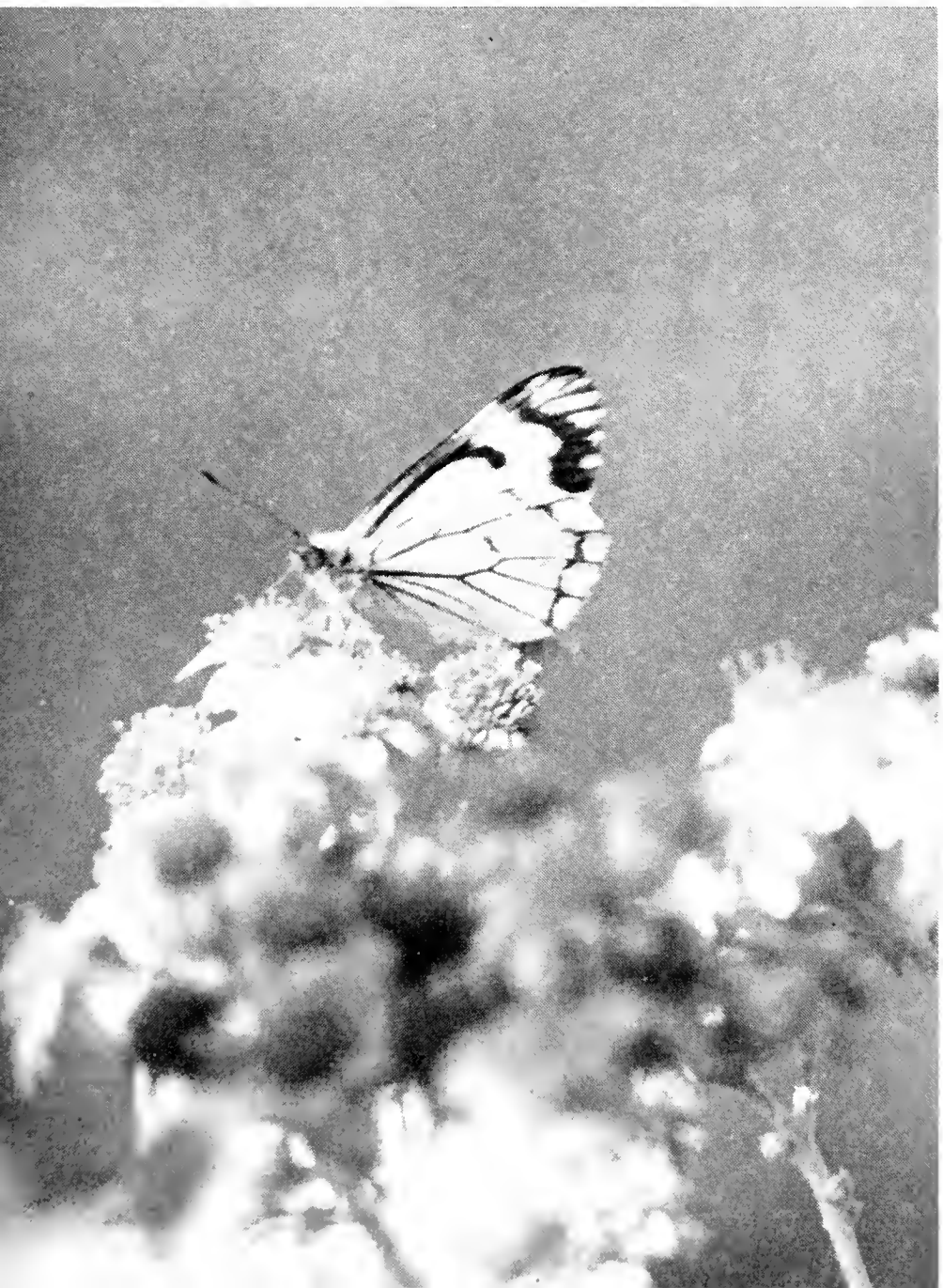
In addition to color and fragrance, butterfly-pollinated flowers have similarities in structure as well. Open, daisy-like flowers or flower-clusters provide the butterflies with an easy perch while visiting the flower. Slippery, drooping or enclosed blossoms make nectar-gathering a difficult task, and there is always the danger of slipping off—an embarrassing occurrence. Even so, determined pale swallowtails *(Papilio eurymedon)* of eastern Washington often can be found fluttering awkwardly at the drooping red flowers of *Gilia aggregata.*

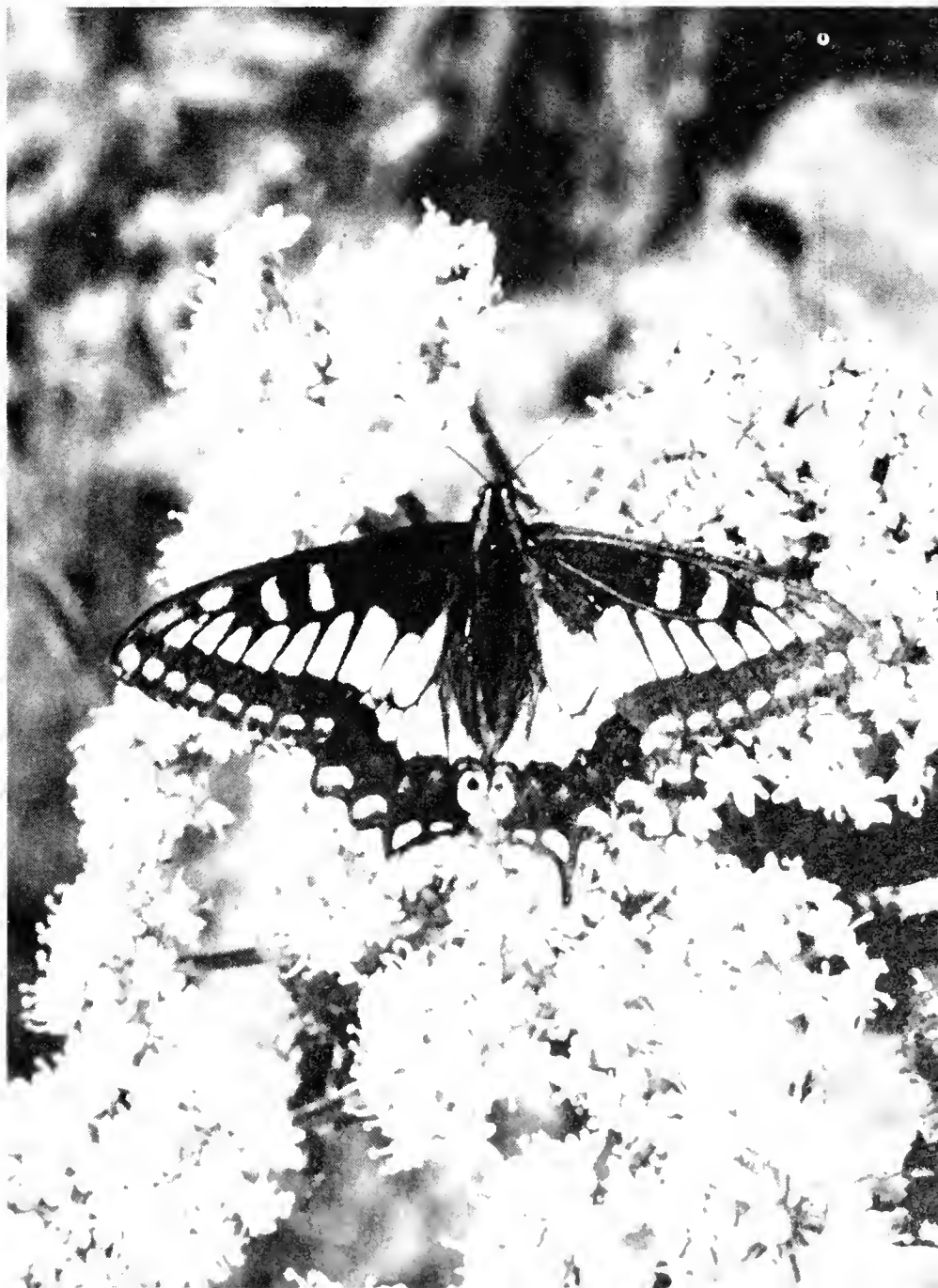
The purpose of nectar is to reward the insects which visit the flower. As the butterfly probes into the flower tube, the proboscis is dusted with pollen. (Pollen may also adhere to the body hairs as the butterfly wallows among the anthers of some flowers.) Since a butterfly will return again and again to a flower species that is providing tasty nectar, the pollen is moved within the species, insuring cross-pollination.

Nectar itself is primarily made up of sugars (sucrose, glucose and/or fructose). Some plants secrete nectar throughout the day, while others have daily peaks of nectar secretion. Sugar concentration also varies with time of day. According to F.N. Howes (1979), "the concentration of nectar in the early morning is often very low. . . but as the day advances various factors such as sunshine, wind and rising temperature or reduced humidity assist in concentrating the nectar so that by midday the sugar percentage may be doubled . . . In the case of an open-type flower the sugar concentration increases at a

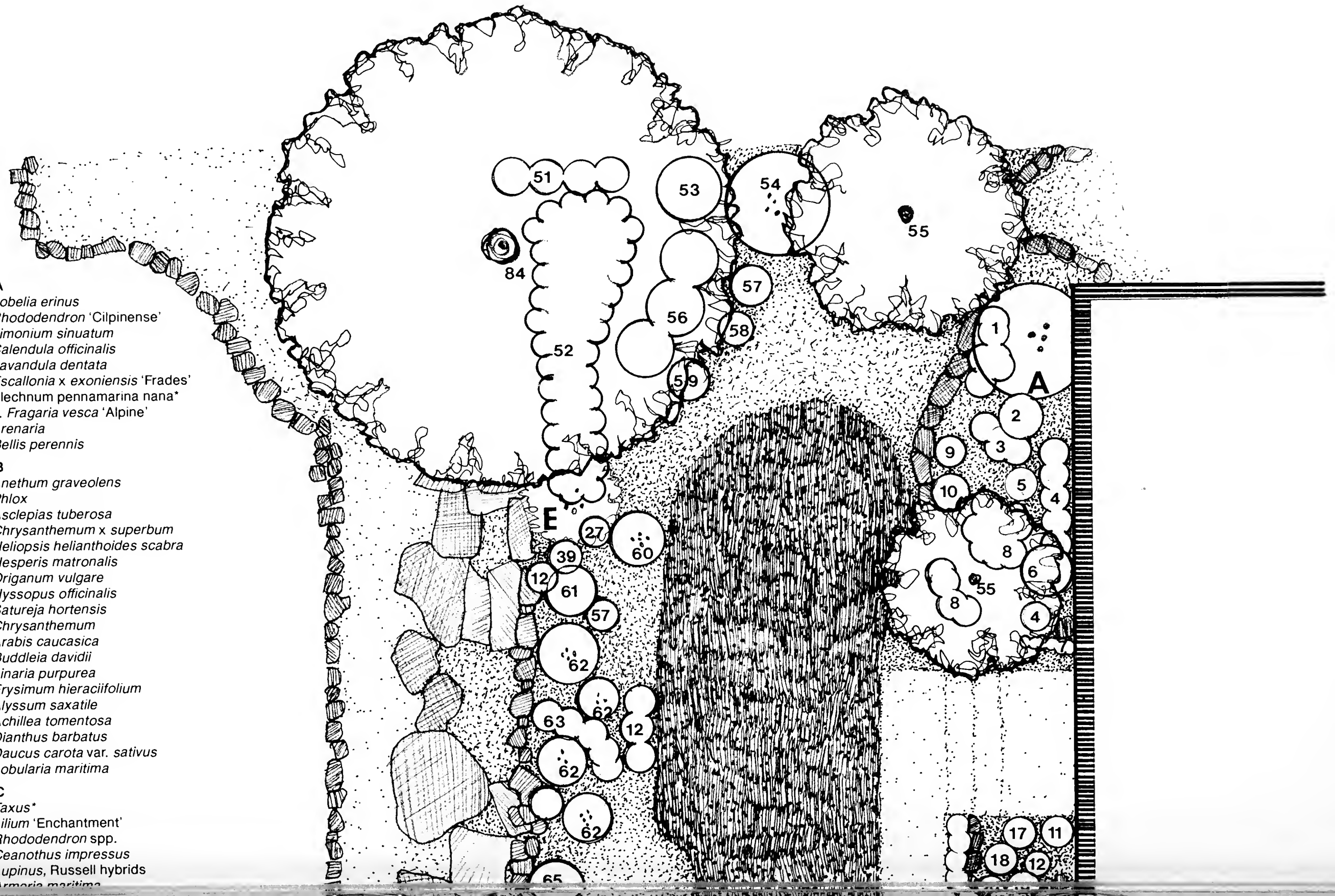
(Above) Woodland skippers *(Ochlodes sylvanoides)* on butterfly bush, *Buddleia.* (Lower left) A pine white *(Neophasia menapia)* visiting dusty miller. (Lower right) The beautiful anise swallowtail on *Heracleum.*

Photos: S.J. Collman





THE BUTTERFLY GARDEN



Bed A

1. *Lobelia erinus*
2. *Rhododendron* 'Cilpinense'
3. *Limonium sinuatum*
4. *Calendula officinalis*
5. *Lavandula dentata*
6. *Escallonia* x *exoniensis* 'Frades'
7. Blechnum pennamarina nana*
8. a. *Fragaria vesca* 'Alpine'
9. *Arenaria*
10. *Bellis perennis*

Bed B

11. *Anethum graveolens*
12. *Phlox*
13. *Asclepias tuberosa*
14. *Chrysanthemum* x *superbum*
15. *Heliopsis helianthoides scabra*
16. *Hesperis matronalis*
17. *Origanum vulgare*
18. *Hyssopus officinalis*
19. *Satureja hortensis*
20. *Chrysanthemum*
21. *Arabis caucasica*
22. *Buddleia davidii*
23. *Linaria purpurea*
24. *Erysimum hieraciifolium*
25. *Alyssum saxatile*
26. *Achillea tomentosa*
27. *Dianthus barbatus*
28. *Daucus carota* var. *sativus*
29. *Lobularia maritima*

Bed C

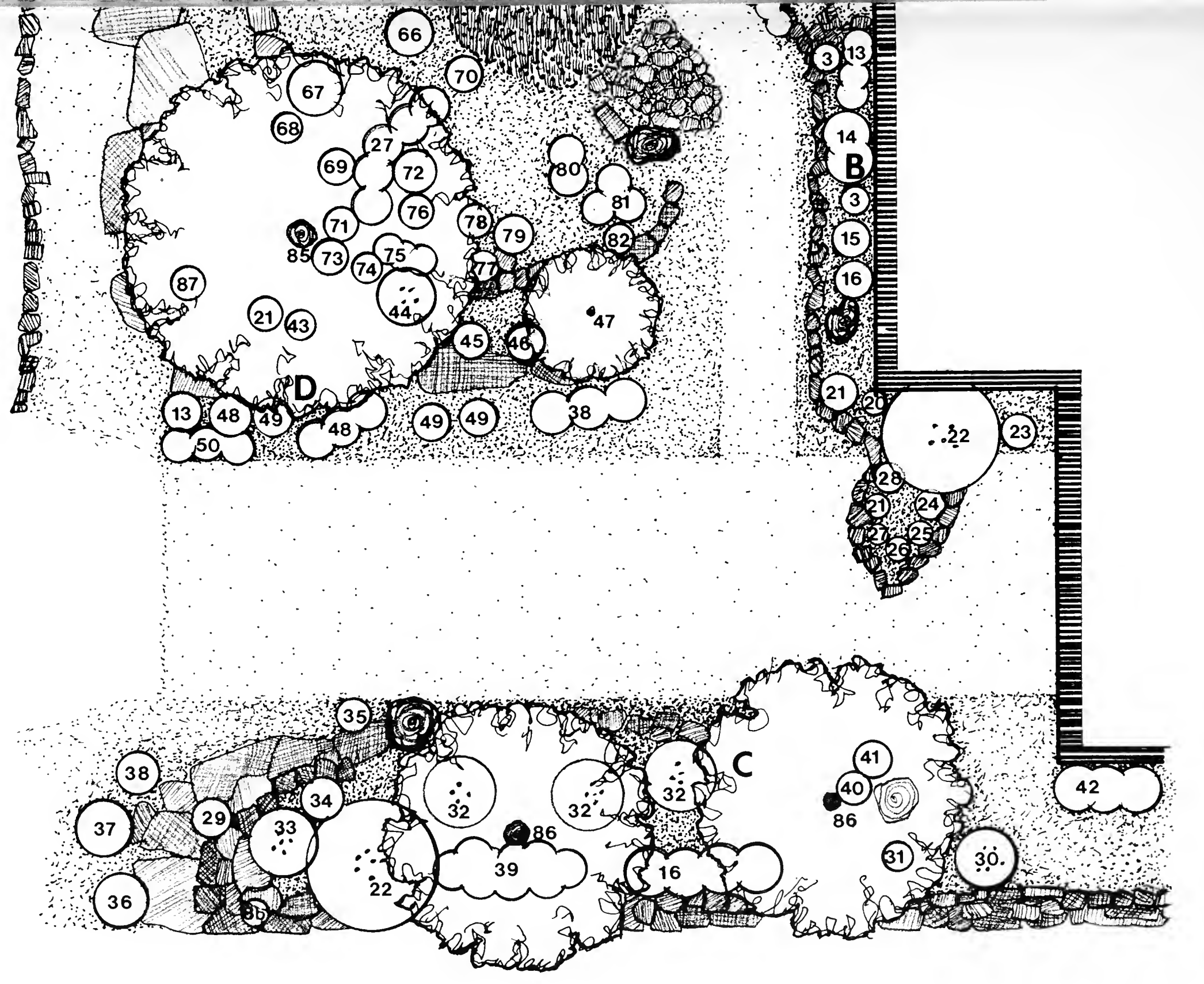
30. *Taxus**
31. *Lilium* 'Enchantment'
32. *Rhododendron* spp.
33. *Ceanothus impressus*
34. *Lupinus*, Russell hybrids
35. *Armeria maritima*

38. *Lavandula angustifolia*
39. *Cornus canadensis*
40. *Zantedeschia aethiopica**
41. *Alchemilla alpina**
42. *Alcea (Althaea) rosea*

Bed D

43. *Erinus alpinus*
44. *Picea abies 'Nidiformis'**
45. *Penstemon rupicola**
46. *Lewisia cotyledon**
47. *Acer palmatum 'Dissectum'*
48. *Centaurea*
49. *Coreopsis*
50. *Sedum spectablie*
51. *Polystichum munitum**
52. *Asperula odorata**
53. *Cornus stolonifera*
54. *Choisya ternata*
55. *Malus* 'Macoun' and 'Spartan'
56. *Paeonia* sp.*
57. *Anthemis*
58. *Salvia*
59. *Lysimachia lobelioides*
60. *Hebe brachysiphon*
61. *Ligustrum*
62. *Rhododendron* x 'Blue Diamond'
63. *Santolina chamaecyparissus*
64. *Daphne cneorum*
65. *Phlox nivalis*
66. *Diascia rigescens**
67. *Raphiolepis umbellata*
68. *Centaurea macrocephala*
69. *Epilobium*
70. *Gentiana septemfida**
71. *Urtica dioica*
72. *Lobelia cardinalis*
73. *Delphinium*
74. *Aster novae-angliae*
75. *Rudbeckia hirta* 'Gloriosa Daisy'
76. *Astrantia maxima**
77. *Echinops exaltatus*
78. *Chrysanthemum parthenium*
79. *Eupatorium perfoliatum*
80. *Callistephus chinensis*
81. *Felicia amelloides*
82. *Erigeron*
84. *Crataegus* 'Autumn glory'
85. *Prunus serrulata* 'Shirotae'
86. *Styrax japonica**
87. *Rhododendron japonicum*

* not butterfly plants



Landscape plan by
Daphne Lewis,
Appropriate Design Company

A butterfly habitat of yarrow *(Achillea)* along the Snake River near Pullman, Washington. Wild habitats provide diverse food and nectar plants for a variety of butterfly species. Yarrow alone is often not a good butterfly plant.
Photo: S.J. Collman

quicker rate than might apply with a closed type of flower." Even the quantity of nectar varies with the environment. Again Howes elaborates: "some of the more obvious and important of these are temperature, humidity, nature of the soil, soil moisture, wind, and the age or vigor of the plant."

Nectar quality may also change as plants are bred or selected for their floral appearance such as double flowers or color. Therefore, the butterfly gardener should select single flowers and avoid hybrids unless they are known to be attractive.

The Nectar Plant List

After reviewing the literature, I found I had a list of several hundred plants which have been mentioned as attractive to butterflies. This preliminary list contains any plant known to be attractive to any butterfly at any location. Now the task will be to reduce this early list to a more manageable size. The ideal plant list will include only those plants adapted to *local* soil and weather conditions, attractive to or visited by *local* butterflies, producing nectar consistently and providing bloom throughout the season or filling in during periods of poor bloom.

It will take several years and many observers to produce a reliable list of butterfly plants for this area. Members of the Butterfly Study Group (a Cooperative Extension project) have already two years of observations and will continue to accumulate information through 1983. Many of the members have planted nectar plants (and food plants) in their own gardens to make observations easier and my own garden has been turned into a demonstration and experimental area.

The plant list (Table 3) included here is just a beginning. Various observers have seen at least one butterfly species nectaring on these plants in the lowland Puget Sound region. It is too early yet to list plants by the species of butterflies they attract or to know if the plants will perform consistently in attracting butterflies. Flowering time, the presence or absence of more attractive flowers, and the preferences of our local butterflies will all influence the final list.

Identifying Butterflies

One look at the many butterflies pictured in the reference books can make the task of identification seem overwhelming. To further complicate the process, many of these bits of color in the garden are flying, or if resting, they are too far away for the identifying marks to be discernible.

Start simply. Get a butterfly book and mark the local species with a signal dot, check mark, or asterisk. Then, begin to learn to distinguish between the basic groups of butterflies such as swallowtails, whites, blues, hairstreaks, elfins, brushfooted butterflies and coppers. Choose one group that looks easy or interesting and concentrate on the differences among the few local species. Table 1 lists the butterflies of lowland King County arranged according to these groups.

Historical Perspective

The butterfly gardener is in good company with naturalists and gardeners of the past. In the 1700 and 1800's, the pursuit of studies in natural

history was the avocation of the wealthy. The contributions of "amateurs" such as Linnaeus, Wallace and Darwin form the foundation of many of our current scientific theories.

Wealth gave these early naturalists the means to travel and study, yet nature study today can be an ideal lowcost hobby. Equipment is minimal and can be purchased inexpensively or even made. Libraries have many reference books, plants can be grown from seed or exchanged with other gardeners, and even photographic equipment is affordable.

Garden literature is filled with the contributions of the non-professional. Rare plants found in alpine areas, introductions of amateur plant breeders, and new selections or forms discovered by the observant plantsperson are treasured by gardeners. The garden naturalist also can make significant observations and contributions to our knowledge of urban garden ecosystems.

Butterfly gardening has its origins in England. L. Hugh Newman (1969) has summed up 30 years of raising butterflies at his butterfly farm in many articles and several books on the subject. He writes, "when I was advising Sir Winston Churchill on what butterflies to introduce into the grounds at Chartwell, I remember he said 'I don't want a lot of exotic kinds, I just want the pretty ones that will stay in my garden and multiply so I can watch and admire them during the summer.' And I think that sums up what most of us would want."

Throughout the United States others have established gardens for butterflies. I thought I had an original idea until I discovered such articles as Jo Brewer's Self Help Sheet #7 titled *Butterfly Gardens* and the section in Damrosch's *Theme Gardens*.

In the Pacific Northwest, interest in butterflies is "blossoming." The Washington State Federation of Garden Clubs has created a new statewide project on butterflies. Audubon Society chapters are focusing on butterflies and other insects in field trips and programs. The Burke Museum at the University of Washington has a fine exhibit of the butterflies of Washington. (They also have an excellent exhibit of the dragonflies of Washington.) The number of observers gathering data and records for the Pacific Northwest Butterfly Survey is ever increasing. With the growing concern for quality of life and living environments in the United States, it seems that butterfly gardening is one of those "ideas whose time has come." (Can beetle gardening be far behind?)

Table 3. NECTAR PLANTS

This preliminary list of nectar plants is based on one year of observations by the Butterfly Garden Study Group. Each plant was visited by one or more local butterflies during 1982. *Buddleia* and thistles *(Cirsium)* were visited by the greater number of butterfly species (5 and 4 respectively). Special credit goes to Louise Kulzer ("Scarabs the Bug Society") for organizing the data and compiling the list. To be effective these plants should be in the sun as butterflies generally avoid shade.

Anthemis anthemis
Buddleia butterfly bush
Calendula calendula
Centranthus ruber red valerian
Cheiranthus esp. "Bowles Purple" wall flower
Choisya ternata Mexican mock orange
Cirsium spp. thistles
Coreopsis coreopsis
Dianthus barbatus sweet william
Heliotropium heliotrope
Iberis candy tuft (purple)
Lavandula spica lavender
Ligustrum privet
Limonium statice
Lunaria money plant, honesty
Mentha spp. most mints
Polemonium Jacob's ladder
Rhododendron ponticum rhododendron
Rhododendron occidentale wild azalea (fragrant)
Salvia sage
Sedum spectabile stonecrop
Senecio dusty miller
Teuchrium chamaedrys wall germander
Verbena verbena, vervain
Viola viola, pansy
Zinnia zinnia

POTENTIAL NECTAR PLANTS

Achillea spp. yarrows
Anethum graveolens dill
Anthemis (Chamaemelum) nobilis chamomile
Apocynum dogbane
Asclepias tuberosa butterfly weed
Asclepias spp. milkweeds
Aster spp. michaelmas daisy, alpine daisy, New England daisy, etc.
Buddleia spp. butterfly bush
Chrysanthemum x *superbum* shasta daisy
Chrysanthemum spp. types with accessible disk florets
Dahlia types with accessible disk florets
Echinops globe thistle
Erigeron fleabane
Eryngium maritimum sea holly
Erysimum hieraciifolium (also known as *Cheiranthus allionii)* wallflowers
Hesperis matronalis sweet rocket
Impatiens balsam, jewelweed
Lychnis coronaria rose campion
Monarda fistulosa and *didyma* bee balm
Phlox spp. phlox
Rudbeckia hirta black-eyed susan
Salix spp. willows
Spiraea spp. meadowsweet
Valeriana officinalis valerian

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'Chrysalis', Sharon Collman's butterfly garden, serves as an area for demonstration and experimentation. She has chosen a wide variety of plants (many known to be attractive to butterflies, some only suspected) and has arranged them in a pleasing manner.
Photo: S.J. Collman

Nettle *(Urtica).* Like lamb's quarters, nettle is a nitrate-indicator (page 30). The plants shown in this photograph are growing at a rather typical site, namely in front of an old shack which acts as a refuge for feral cats that provide nitrate to the environment *via* their excrements.
Photo: B.J.D. Meeuse

The Limits of Edibility
A Warning to the Starry-Eyed

*B. J. D. MEEUSE**

Editor's Note: Caution is in order in the larder and the garden. Dr. B.J.D. Meeuse begins to raise public awareness of the dangers lurking naturally in some common food items. Don't read this article until after dinner!

There can be no doubt that collecting and eating wild mushrooms, blackberries, blueberries and even certain edible weeds is great fun. To be exposed to the great outdoors is also a bath for the soul. However . . . a joker might immediately wish to interject here that for some individuals (including the present writer) such a bath is not entirely superfluous. Who can deny that some of our exhilaration comes from a sense of "licking the establishment," of getting something for free because we form part of a special group, almost a secret society, blessed with superior knowledge? Cultism is bad in any form; it can easily lead to intolerance and dogmatism, and as we hope to demonstrate it may even become suicidal.

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Caution and the Current Myth

Here are a few of the beliefs which certain wild-food *aficionados* cling to, in spite of solid evidence to the contrary.

Natural vitamins are, somehow, better than store-bought ones. This accounts for the popularity, in some circles, of vitamin C from rosehips. In reality, vitamins are well-defined chemical compounds, and there is not one shred of difference between vitamin C (or ascorbic acid) crystallized from rose hips and vitamin C synthesized by a chemist. It is worthy of note that, although it is not hard to make, the rose hip vitamin C commands a higher price than the other kind.

In most cases, raw is better than boiled. *Wrong!* There are plenty of instances in which it is imperative to boil or cook plant products in order to make them digestible or to eliminate

poisonous substances. For example, there is not a single digestive enzyme that is capable of breaking down raw potato starch grains. Even when these are left in a test tube with some saliva for weeks, inspection of samples under the microscope at regular intervals does not reveal any evidence that they are being attacked. Heated with water, or boiled, these selfsame grains will yield a paste which is broken down by saliva with the greatest of ease. The stored carbohydrate in Jerusalem artichokes *(Helianthus tuberosus)* and camas *(Camassia quamash)* represents another reserve material that enjoys a certain digestive immunity, at least as far as human enzymes are concerned. In contrast to what we see in starch, its molecules (which are very large) are composed of repeating units of fructose, and not glucose. It is well known that in its free form, fructose (the main ingredient of honey) is highly nutritious; however, we cannot obtain much benefit from the carbohydrates of camas or Jerusalem artichoke unless a certain chemical breakdown has taken place, and this must be achieved by prolonged boiling or cooking. In the case of camas, the Northwest native Americans knew this very well. They also subjected skunk cabbage leaves to prolonged heating before eating them, but the purpose here was a different one. Like many other members of the arum lily family (dumb cane or *Dieffenbachia* is probably the most notorious example), skunk cabbage has in its leaf cells a multitude of microscopically small, needle-like crystals of calcium oxalate. In combination with certain irritating chemicals, which are also present, they create a horrible, long-lasting burning sensation in the mouth of the unwary skunk cabbage eater. Long heating is the best way to destroy the crystals.

Many plants and their seeds contain so-called cyanogenic glycosides, the biological function of which may well be to act as a defense against herbivores. When the raw tissues of these plants are crushed and the cells ruptured, these glycosides will react with certain enzymes that are also present, so that hydrocyanic acid is formed. After the recent cases of drug tampering, we do not have to emphasize the extreme toxicity of this compound and its salts (cyanides). Indeed, to eat a handful of raw apple seeds, apricot kernels or bitter almonds could be fatal. (One of the gravest risks connected with the use of some of the alleged cures for cancer derived from apricot kernels is that hydrocyanic acid may be liberated, doing the patient more harm than good.) Yet, the average pastry cook uses bitter almonds all the time, and with complete impunity: since hydrocyanic acid is volatile, it escapes during the baking.

A mushroom that should never be eaten raw because it is capable of producing hydrocyanic acid is *Marasmius oreades*, the fairy ring mushroom, which in summer and fall and also in rainy

Young plants of Western skunk cabbage *Lysichitum americanum*. Like many other members of the arum lily family, skunk cabbage contains an abundance of minute calcium oxalate needles which make eating the plant hazardous.
Photo: B.J.D. Meeuse

springs can often be found in abundance on lawns. Boiled with noodles or in chicken soup, or sauteed in butter, it is perfectly harmless—and delicious!

A third stubborn belief of some wild-food enthusiasts is that in nature there still are plenty of species of wild plants just waiting to be exploited. Are human conventionalism, laziness and ignorance the only reasons why this plant exploitation has not been done earlier? This belief reflects a somewhat disdainful attitude towards our ancestors who, with great skill, perseverance and perhaps luck have, over the last 5,000 years or so, been doing a beautiful job of selecting for cultivation—and constantly improving—those species of wild plants that had the most to offer to begin with, or showed the greatest potential for improvement. In many ways, the grab bag that is left after this continuous process of setting aside the best forms, is not really something to write home about. Several of the remaining species can be accepted as food sources only with certain reservations; one must know how to handle them, how to make them acceptable.

But even if we broaden the term "edibility" by essentially substituting "acceptability" for it, fair and fruitful discussions in this field remain difficult for a variety of reasons. First of all, we are still talking about something which is relative and fluctuates with the prevailing circumstances. In times of famine anything that can compete successfully with shoeleather becomes "edible"! Secondly, quantity is extremely important. Even such things as vitamin A and thiamin—substances which in low amounts are absolutely essential for our well-being—can become toxic when consumed in large quantities. High dietary levels of yeast, an excellent source of thiamin and protein which nutritionists had really pinned their hopes on, have turned out to induce severe gout-symptoms even in persons who have no genetical predisposition for that condition. Vitamin C or ascorbic acid, which in normal persons can be taken in very high doses with complete safety (any excess is simply excreted with the urine) should be used with caution by gout-sufferers and pregnant women.

We cannot take it for granted that there are natural ("instinctive") barriers preventing such overconsumption of nutrients, and even bad previous experiences do not always provide adequate protection. An outstanding example of this is the case of djengkol or djenkol *(Pithecellobium lobatum)*, a tree in the legume family whose big, smelly, round seeds are in the East Indies consumed with great relish, mostly by men. Experience has taught many of the djenkol-eaters that overindulgence will have dire consequences. However, claiming that they know exactly what their limit is, several persons will still eat too many of these beans. The result is agonizing pain in the bladder-region and the urinary duct, and loss of blood with the urine. These symptoms are caused by the presence,

The fairy ring mushroom, *Marasmius oreades*. These mushrooms should never be eaten raw, as explained in the text. **Photo: B.J.D. Meeuse**

in the lining of the affected body parts, of innumerable tiny crystals of djenkolic acid, an unusual amino acid present in bound form in the djenkol beans and liberated when these undergo digestion. In free form, the acid is very insoluble so that it crystallizes out readily. Although biochemistry textbooks do not usually dwell on it, it is this situation which has led to the discovery of djenkolic acid by A.G. van Veen.

Nitrate-rich Plants, The Quiet Killers

Once a villain has been unmasked, his threat is greatly diminished. One now knows that in dealing with him it is imperative to remain on guard—always. Unfortunately, there are in the plant world a number of villains which, in contrast to djenkol, have never been recognized as such by a broad public. Some even have been masquerading as very useful, tasty citizens of the plant kingdom, enjoying high esteem! Let us unmask these wolves in sheep's clothing, as a simple public service, here and now!

Having mentioned sheep, it seems logical to start out with lamb's quarters, *Chenopodium album*, a popular food item especially in the southern United States. As a member of the beet family *(Chenopodiaceae)* it has among its relatives such plants as spinach, beets and Swiss chard, as well as a quaint fellow by the name of Good-King-Henry, *Chenopodium bonus-henricus*, the beer plant. Dutch botanists, finding it after a long and hot field trip, have been known to shout with joy, for its presence indicates that there is a tavern—and cool, refreshing beer—within a half a mile. This is not a myth. A tavern means human habitation and at least a few houses, and this makes it a pretty safe bet that there are domestic animals around: dogs, cats, perhaps even some sheep and horses. "Domestic animals" means excrements, that is: organically bound nitrogen. In the soil, certain bacteria quickly convert this to nitrate, and it is this compound, finally, that determines the presence of our good old friend, the beer plant. To put the story in a nutshell: *Chenopodium*-species, spinach *(Spinacia)* and beets *(Beta)* are good nitrate-indicators; they just love the compound, pick it up greedily and tend to build up high levels of nitrate in their own bodies. In certain situations, this can make them useful. Spinach seedlings, for instance, have been used in tests to determine the nitrate-level of certain soils. They are also very good if one wants to eliminate most of the nitrate from soils deliberately. In recent years, this has been done in Holland in a very successful program to make roadsides more attractive by encouraging the growth of wildflowers. A nitrate-rich soil, resulting from overfertilization, favors the development of grass, one of the main wildflower-enemies. Since most butterflies depend on wildflowers as food for their larvae, nitrate must in the final analysis also be held partially responsible for the serious decline of the butterfly population in western Europe. For nature-lovers, therefore, it is not hard to see spinach and weedy chenopods such as lamb's quarters as allies. Nutritionists, however, should consider them to be mortal enemies. Studies at the University of Wageningen in the Netherlands have shown that an average Dutch male, eating just one dinner with spinach as the vegetable, will consume four or five times the safe daily dose of nitrate! In the human body, part of the nitrate is quickly converted to nitrite, and this, in turn, is rapidly changed into nitrosamine—one of the most carcinogenic agents known. To eat more

Lamb's quarters, *Chenopodium album*. Although popular as a food, especially in the American South, this plant should be eaten in moderation because of its high nitrate content.
Photo: B.J.D. Meeuse

than one spinach meal a week is, therefore, very unwise. It is ironical that some of the selfsame people who, in their ignorance, force nitrate upon their brood by insisting they eat spinach, object (admittedly wisely) to the use of nitrite and nitrate in meat products such as ham and sausage.

Certain enzymes are extremely sensitive to nitrate. One of these is oxalic acid oxidase, and in our laboratory at the University of Washington we have used this agent to study nitrate levels in different parts of one beet plant. The results have been fascinating. The root has a moderate level of nitrate—as one might expect because it is this organ that picks up the salt from the soil. In the leaves, the level is low—which, again, is not unexpected because here the nitrate is converted to amino acids and ultimately to protein. Amazingly, the leaf stalks have an exceedingly high level of nitrate. The moral of the story is clear: do not eat beet greens, at least not before you have removed the leaf stalks and the big veins. The same is true for Swiss chard—where, unfortunately, the leaf stalks are considered by many to be the choicest parts.

Double Villainy: Oxalates

The nitrate-rich plants we have just discussed also happen to be rich in oxalic acid and its salts (oxalates). In human nutrition, these compounds, although not carcinogenic, have to be regarded with suspicion too.

Oxalate is not essential to life, and in our bodies it undergoes no chemical changes; after having been absorbed from the intestine, it exits again with the urine. Too high a level of oxalate in that fluid (a condition known as hyperoxaluria) can lead to the formation of kidney stones composed of calcium oxalate. Fortunately, it is unlikely that this will happen in healthy people, even though our normal dietary intake of oxalate is fairly high (80 to 100 milligrams a day). The fact is that most of the oxalate we receive in our food is not absorbed at all: in the cavity of the small intestine it reacts with the calcium that is found there to form an insoluble salt which is simply excreted. In people living on a diet with a high proportion of leafy vegetables (i.e., a high-oxalate diet), there is of course a risk that too much calcium (and other metals, such as magnesium and iron) will be removed from the body in this fashion, but this danger has probably been overestimated. However, there are plenty of people who have some trouble with the digestion of fats; they may suffer from a condition which leads to a reduced absorption (and thus to a higher level) of fatty acids. The calcium found in the small intestine tends to react *preferentially* with these, with the result that the oxalic acid, rather than being precipitated, remains in solution, which gives it a much higher chance of being absorbed and thus causing kidney stones. In addition, people with intestinal disease often suffer from a malabsorption of bile salts, with the result that there is an increased passing of these compounds into the colon. The upshot of this is that oxalate uptake from that part of the intestine will be boosted.

Needless to say, for all those people who in some way or other tend to develop hyperoxaluria, it is imperative to avoid oxalate-rich foods. Absolutely taboo should be such items as boiled spinach, with 750 mg of oxalate per 100 grams (roughly equivalent to 1/2 cup); stewed rhubarb (with 860 mg/100 g); boiled beetroot (with 675 mg/100 g); Swiss chard (with 645 mg/100 g) and pokeweed (with 476 mg/100 g). "Edible" weeds with free oxalic acid in their cell sap, such as *Oxalis* or woodsorrel, and *Rumex*-species such as dock and sheep sorrel are, of course, in the same "danger" category. Food supplements of ascorbic acid (vitamin C) have to be kept down also, because in some people this compound is partially converted to oxalate!

Research to the Rescue!

From the case histories we have given so far it is clear that modern research has helped us in the unmasking of certain plant villains. These histories constitute a beautiful demonstration of the great value which the *combined* efforts of biochemists, botanists, nutritionists and cancer-specialists can have. Here are some other plants that have been added to the rogues' gallery in recent years.

Just a few years ago, bracken fern *(Pteridium aquilinum)* was receiving lavish praise as a gourmet food, comparable to asparagus. The steamed young shoots (fiddlenecks) could be ordered in some Seattle restaurants! It has now been demonstrated beyond doubt that the plant is highly carcinogenic. Shikimic acid, present in high concentration, is one of the culprits—although possibly not even the worst one. The

Bracken fern, *Pteridium aquilinum*. Consumption of the young fronds (a popular food item in Japan) should be discouraged because they are highly carcinogenic.
Photo: B.J.D. Meeuse

argument that bracken fern is a popular food-item in Japan should be received with sadness, because the incidence of stomach cancer in that country is one of the highest in the world, and it may be that bracken is a contributing factor.

Comfrey *(Symphytum officinale)* has been touted as a super-food and a cure-all, but in reality it too is highly carcinogenic. Carefully designed experiments with rats who received comfrey leaves and roots in their diet over extended periods have shown that practically all the experimental animals developed liver cancers.

The young flower stalks and petioles of colt's foot *(Petasites* and *Tussilago)* are valued as food especially by Japanese-Americans and are also used for preparing expectorants. Unfortunately, they too are carcinogenic.

Some of the books on edible wild plants recommend the candied roots of wild ginger *(Asarum caudatum)* as a good substitute for real ginger. Although carcinogenicity, in this case, is only suspected, no wise person should ever consider *Asarum* for culinary purposes. The family to which it belongs (the Aristolochiaceae or pipe-vine family) is notorious for its poisonous qualities. Although slugs may munch one type of *Asarum* with impunity, very few types of insect larvae feed on these plants! (Among these are the caterpillars of the pipe-vine swallowtail; but these could specialize on pipe-vines because in the course of geological history their ancestors somehow developed mechanisms enabling these animals to cope with the plants' toxicity. This case is comparable to that of the monarch butterfly, whose caterpillars are specialists living on members of the poisonous milkweed family.) The unusual pollination-situation of *Asarum caudatum* clearly shows how poisonous this plant really is. The animals taking care of the pollen-transport here are female fungus-gnats who, mistaking the flowers for favorable breeding-sites, deposit their eggs in the flowers' throats. When the young larvae hatch, they start eating almost immediately—but they also promptly give up the ghost because the plant's tissues are so poisonous! Admittedly, roots are not flowers, but we have no reason to assume that in *Asarum* they are much better in terms of edibility. After the fungus-gnat demonstration, why take chances?

Environmental Hazards

If your home is situated right next to a busy highway, it is not a good idea to eat dandelions from your front lawn: they may have picked up, from the soil, too much lead originating in the exhaust-fumes of cars. It is an ironical and sad thought for a nature-lover that some environmental hazards of this sort are quite "natural," manifesting themselves in—of all things!—honey, that divine food which one can easily think of as the sublimated goodness, the true "essence," of a lovely and smiling unspoiled landscape. It has been known from time immemorial that certain nectars are poisonous to humans. Most of these are found in members of the heather-family (Ericaceae), for instance in species of *Rhododendron, Azalea* and *Pieris*. California buckeye *(Aesculus californica)*, which is in a different family, is rumored to have poisonous nectar also, but this is based on a misconception. Bensler has shown that in reality it is the pollen that is poisonous; honeybees will collect it and take it to the hive, with the result that many members of the colony will become

sickly so that they will no longer perform their regular duties. Honey always contains some pollen, and in this case that is obviously bad. In general, California beekeepers are now aware of the situation; they will move their beehives out of certain areas as soon as the buckeye there begins to bloom. (It may seem paradoxical that honeybees, our main pollinators, should be so ill-adapted to a good nectar-producer such as California buckeye. However, in judging the situation, one must always keep in mind that honeybees are not native to America!! The natural pollinators of buckeye are butterflies, animals which with their slender proboscis can suck up the nectar without risk of contaminating it with pollen.)

In the state of Washington, "contaminated" honeys have already put in an appearance. Honey from *Kalmia polifolia* caused severe poisoning among several people a few years ago. Another culprit would be tansy ragwort *(Senecio jacobaea)*, a pesky European weed that has made heavy inroads in Oregon where it is a poison to livestock. Efforts to control it with a particular type of caterpillar have been only moderately successful. In the last few years, tansy ragwort has been spreading rapidly in Washington. Its poisonous and carcinogenic properties are based on the presence of so-called pyrrolizidine alkaloids. In those cases where flowers of tansy ragwort provide the bulk of the bees' food, the honey will be quite toxic to humans. Fortunately, its bitter taste would also make it unpalatable. The risk lies in the fact that small amounts of this honey may end up being mixed with honey from other, "innocent," flowers. It would then present us with a genuine hazard.

The Moral of the Story

To sum up this narrative in a few words: let us be cautious at all times, and let us make every effort to be well-informed so that cool heads can guide starry eyes.

Postscript

An extensive article dealing with the topic of dietary carcinogens recently appeared in Science *221 (4617), 23 September, 1983.*

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Flowers of wild ginger, *Asarum caudatum*.
Photo: Tom Boyden

Evergreen Asiatic Oaks and Their Near Relatives in the Arboretum

BRIAN O. MULLIGAN

Botanical Classification

In the floras of Japan (Ohwi), of Taiwan (Li), and of China (Lee), the evergreen Asiatic oaks are not confined to the genus *Quercus,* but are also to be found in several closely related genera. Species of *Quercus* itself in temperate regions may be either evergreen or (more often) deciduous; they are characterized by having the male flowers produced in pendulous catkins, the wind-pollinated female flowers produced singly, and the scales of the acorn cups (cupules) merely overlapping one another. The Arboretum has one Asiatic species of true *Quercus, Q. phillyreoides,* an evergreen used for hedges in Japan.

In contrast, *Cyclobalanopsis,* consisting of evergreen species characterized by cupule scales connate in concentric rings, may sometimes be separated as a distinct genus (as in Li), but more often kept as a subgenus within *Quercus* (as in Rehder, Lee and Bean, which we have followed here). Four species in this group are to be found in the Arboretum, although none has yet produced mature fruits.

Genera in which the male flowers are produced in upright spikes and the female flowers are insect-pollinated include *Castanopsis,* in which the fruits are enclosed in a spiny or warty husk and the leaves are arranged in two ranks. However, the native golden chinquapin of the western states, formerly considered to be a species of *Castanopsis (C. chrysophylla),* has recently been transferred to a new genus *Chrysolepis,* on account of differences in both flowers and fruits. In *Lithocarpus,* of which the tanbark oak is our solitary western American representative, the flowers are borne as in *Castanopsis,* but the cupule more or less covers the nut and is fused to it. As with *Castanopsis,* the Arboretum possesses only a single species of Asiatic origin, namely *Lithocarpus henryi* from China.

Closely allied to *Lithocarpus* and by some authorities included in it, is *Pasania,* in which the saucer-or cup-shaped involucre may have either distinct scales or concentric rings. We have followed Ohwi's *Flora of Japan,* English edition (1965), in designating the two species here as *P.edulis* and *P.glabra.*

Genus QUERCUS
(treated alphabetically)

Quercus gilva

This species which is native to Japan (except-ing the northern island of Hokkaido), Korea, eastern China and northern Taiwan, was raised here from seeds received from the Botanic Garden of Osaka City University, Osaka, Japan, in April 1957. Three plants from this source are now growing in the Arboretum. The best one is in the northwest corner of the Japanese garden where it was planted in April 1967; it is now 14 feet tall and almost as much in width. The other two are in the main oak collection west of Azalea Way, one north of the trail leading to the East Lynn Street footbridge, the other south of the dwarf conifer collection. Both are shrubs rather than trees at the present time.

The young shoots of *Quercus gilva* are slender and flexible, covered with stellate scales, the leaves tending to cluster towards the apex of the shoot; the second year wood becomes chocolate brown and smooth. The leaves are 5.5 to 7 cm long, 2.3 to 3.5 cm wide, obovate, generally more or less flat, dark green, dull and glabrous on the upper side, and denticulate in the upper third to one-half. The apex is abruptly acuminate, the base cuneate, the underside white, completely covered by a dense tomentum. There are 8 to 10 pairs of veins raised

Fruiting branches of *Lithocarpus henryi* at the United States National Arboretum.
Photo: B.O. Mulligan

beneath, and the petiole, only 5 to 8 mm long, is densely tomentellous as on the young stems.

The specimen in the Japanese garden promises to form an attractive evergreen tree in the future, forming a dark green mass in the landscape. In Japan it is planted in the grounds of temples and shrines as well as in gardens.

Quercus glauca

This species is widely distributed in Japan, especially in the central and southern districts and particularly around Kyoto; it is also found in China (except in the northern provinces), in Korea and in Taiwan. It is capable of becoming a large tree over 60 feet in height. E.H. Wilson reported it as the most common evergreen oak in parts of central China when he was there from 1907 to 1909.

The single tree in the Arboretum, which is to be found at the northeast corner of the oak section, facing Arboretum Drive, is derived from a gift of ten plants received from Mrs. O. B. Thorgrimson of Seattle in December 1937. The source of the plants is not known, but may have been a nursery in California. They were at that time labelled *Quercus acuta,* and this particular plant was grown under that name until 1955 when a specimen was sent to the Arnold Arboretum in Boston, where it was determined to be *Q.glauca*. *Quercus glauca* is quite easily

Foliage of *Quercus myrsinifolia,* growing on Foster's Island. **Photo: B.O. Mulligan**

distinguished from *Q. acuta* by having, amongst other characters,leaves toothed in the upper part and covered with fine hairs beneath. No other plants of this lot now remain in the Arboretum. After about forty years our single plant has reached a height of 21 feet, with a trunk diameter of six inches. It flowers quite regularly but has never produced acorns.

The young shoots of *Quercus glauca* are chocolate brown, lenticellate, often with the remains of a floccose pubescence; the terminal buds are ovate, green, the scales ciliate, 4 to 5 mm long. The leaves, which are shed in spring when the new growth starts, are 7 to 9.5 cm long, 3 to 3.8 cm wide, lanceolate, tough in texture, rather abruptly acuminate, cuneate at the base, serrate in the upper half and glabrous on the upper side with clearly visible veins. The midrib is yellowish towards the base, the underside covered with silky appressed hairs; the 9 to 11 pairs of veins are raised (especially the midrib) and extend out to the margin of ihe leaf. The petioles are 1.2 to 2.0 cm long, glabrous.

Quercus myrsinifolia

This is the only species of the group included in Rehder's *Manual of Cultivated Trees and Shrubs* as being hardy in his Zone VII, which includes the Puget Sound region and southwestern British Columbia. In the wild state it has a similar distribution to *Q. glauca,* but excluding Taiwan; in China it is more scattered and chiefly found in the eastern provinces. It is also the only species amongst those treated in this article which is listed in *An Annotated Checklist of Woody Ornamental Plants of California, Oregon, and Washington.* (University of California Division of Agricultural Sciences, 1979).

The original spelling of the specific name was *myrsinaefolia,* but recent changes in the *International Rules for Botanical Nomenclature* correct this and similar examples, using "i" instead of "ae" to connect the syllables.

The first plants received in the Arboretum came from the United States Department of Agriculture (P.I. 74222): two plants in 1940 and three in 1942. All five were planted on Foster's Island in January 1946, but only one now remains which is 19 feet in height. It stands out conspicuously near the center of the island amongst various birches, alders and deciduous oaks. This tree was observed to flower in early May, 1983, for the first time so far as known. A second plant given by Carl S. English, Jr., of Seattle, in 1957, was planted in the Japanese garden in November 1960 but failed to establish itself. The next plant came from the Arboretum of the University of California at Davis, in January 1960. Six years later this was also planted in the northwest corner of the Japanese garden, which in Mr. lida's original plan was reserved for such native evergreen trees. Here it has thrived and is now a densely branched bushy tree 17 feet in height, 21 feet across.

In 1963 seeds of this species were received from the Botanic Garden of the University of Osaka, Japan. One plant raised from these was placed on the ridge at the northeast corner of the oak section in March 1974 when five feet tall; by March 1983 it had attained 11 feet and was growing well in a much less sheltered site than the Japanese garden.

The final acquisition of this species was a small plant given to the Arboretum in November 1963 by Mr. Donald Stryker of Langlois, Curry County, Oregon, a collector and grower of unusual woody plants. Planted in the northwest corner of the Japanese garden, probably in April 1971, near to the earlier tree from Davis, it is now a flourishing tree 17 feet tall, 14 feet across. These two specimens form an attractive pair in that corner of the garden and can be expected in time to grow considerably larger.

The young shoots of *Quercus myrsinifolia* are olive-brown, quite smooth; the winter buds ovate and blunt, the scales in winter tightly wrapped and having an interesting color pattern when examined under a hand-lens, being pale green in the lower portion but brown around the upper edges. The leaves are scattered along the shoots, lanceolate in shape, acuminate at the tip, mostly 7 to 10 cm long but only 2 to 3 cm wide, the margin serrated in the upper half or two-thirds; there is some variation in the leaves of different individuals, as one would expect among plants from seeds rather than from cuttings. The leaves are pale or medium green on the upper side but glaucescent beneath, the veins mostly 10 to 12 pairs, the midrib raised prominently on the underside. When these plants begin to flower there should then be a good chance of obtaining fertile fruits from the two trees in the Japanese garden. In Japan, where this tree may reach 80 feet in height, it is considered to prefer cooler areas than does *Q.glauca* and is often used as a shade tree in parks or squares, or is even clipped to form tall hedges.

Quercus phillyreoides

This is a species of true *Quercus,* having imbricated scales on the acorn cups. In Japan it grows near the seacoasts and is often shrubby in habit but may attain 30 feet in height; it is slow-growing and often used to form dense hedges. In China it is quite common in the eastern and central provinces but rare in the west. It is not found in Taiwan.

The first plants received here were seedlings from the Morton Arboretum, near Chicago, in April 1951. These had been raised from seeds received from the Imperial University at Tokyo. Only one sapling survived to planting size; in March 1958, it was placed near to the northeast corner of the oak section, on a slight slope to the east amongst some native maples *(Acer macrophyllum).* Here this tree has thrived and is now 21 feet in height, bushy at the base but with a strong leader. Flowering was first noted in May 1980, but previous flowerings may have been overlooked.

The plants at the Morton Arboretum failed to survive in that climate, as one would expect, which was also the case there with *Quercus myrsinifolia*.

A second lot of three young plants which had also been raised from Japanese seeds came from Mr. Ed Murzynski of Hillsboro, Illinois in March 1959. All three were planted in February 1962 on a steep sandy bank south of the magnolia section in the Arboretum, when no more than two feet in height. Only two plants now survive; the larger is a bushy small tree about 15 feet tall and somewhat more in width, the second evidently suffered from the competition of a very vigorous species of *Rubus (R. tricolor)* planted as a ground cover and is now only 5 feet tall.

Although the leaves of *Quercus phillyreoides* somewhat resemble those of *Q. gilva,* being about twice as long as wide and having a few

A tree of *Quercus myrsinifolia* in the northwest corner of the Japanese Garden. Photo: B.O. Mulligan

Foliage of *Quercus phillyreoides*, from the oak area in the Arboretum. Photo: B.O. Mulligan

teeth in the upper part, they have only 6 to 8 pairs of veins instead of 8 to 10, and are glossy on the upper side, and pale green and glabrous on the lower. In size they range from 3.5 to 5 cm long, 2 to 2.5 cm wide, the texture coriaceous, the apex acute or acutish, the base rounded to broadly cuneate, the veins 6 to 7 pairs, running out to the teeth. The petioles are densely stellate-tomentose like the young shoots; the leaves remain only two seasons and are mostly clustered towards the ends of the shoots as in *Q. gilva*. The fruits, which we have not seen here, require two years to ripen.

Quercus sessilifolia

This we believe to be the proper name for a handsome tree now growing in the Japanese garden. This tree was raised from seeds collected in southern Japan and sent to the Arboretum by the Missouri Botanic Garden, St. Louis, in December 1953 as *Q. paucidentata*. Only one was raised to planting size and was set in the extreme northwest corner of the garden in November 1960, the year of the garden's construction. It is now a vigorous and healthy specimen 20 feet in height and width; evidently the site and local soil conditions, together with regular watering in summer, have agreed well with it and the other two species located here. In the wild state *Q. sessilifolia* extends from Japan, excepting Hokkaido, south into the mountains of central Taiwan, and also into southeastern China.

The young shoots of this tree are brown and smooth, the winter buds silky pubescent. The leaves are distributed along the shoots, coriaceous in texture, lanceolate in shape, shortly acuminate with a decurving tip, 6.5 - 8.5 cm long, 2.8 - 3.2 cm wide, usually entire but sometimes slightly serrate towards the apex, the upper side somewhat shining, the lower pale green and glabrous. There are 8 to 9 pairs of veins, more visible beneath than above, with the midrib raised; the petioles are 5 to 6 mm long, glabrous. A few male inflorescences were noticed on this tree in early May, 1983, but no female.

In the *Catalogue of Woody Plants in the Arboretum* (1977), this specimen was listed as *Quercus nubium,* a species described from eastern China in 1922 and which may or may not be the same as our tree. We are awaiting an authoritative opinion on this question from the Arnold Arboretum.

Genus PASANIA

Of this wholly Asiatic genus of fifty or more species which is closely related to *Lithocarpus* we have only two representatives in the Arboretum, namely *Pasania edulis* and *P.glabra*. Both are natives of Japan but the latter also of some provinces of eastern China and of Taiwan where it grows in the central ranges up to nearly 9,000 ft. elevation. Like most of these evergreen oaks, the range of these two species does not extend as far north as Hokkaido island of Japan.

Pasania edulis

The original plant of *Pasania edulis* was received from Mr. Carl English, Jr. in March 1957 as a year old seedling, raised by him from Japanese seeds. In November 1960, when about

four feet tall, it was planted in the northwest part of the Japanese garden among the other evergreen oaks. Here it remained until April 1972 when several branches were deliberately broken off the young tree and it had to be transferred to the upper lath house to recover. Five years later, when five feet tall, it was replanted on the lower part of the Himalayan hillside, south of Loderi Valley and above Azalea Way. It appears to appreciate these rather shady surroundings and by early in 1983 had attained seven feet in height. A cutting rooted from it, probably in 1972, has this spring been given a home on the bank close to the north entrance to the Arboretum; it is also about seven feet tall and in excellent health.

The young shoots of *Pasania edulis* are green and smooth; the handsome coriaceous leaves are lanceolate in form, acute to acuminate, tapered to the base and decurrent down the petiole, glabrous, mostly 12 to 14 cm long, 4 to 5 cm wide, shining on the upper side, dull pale green beneath, the margins entire. There are 9 to 11 pairs of veins raised on the underside; the petioles are 1.5 to 2.0 cm long.

In Japan this tree may reach 50 feet in height and is reported as fast growing and adaptable to either dry or moist situations. It also recovers well after pruning. The acorns are used for food. Like the following species it promises to be an unusual small evergreen tree for this area, if it survives future colder-than-normal winters.

Pasania glabra

Pasania glabra was first acquired in the form of seeds sent us in March 1959 by Mr. Ed Murzynski of Hillsboro, Ill. The seeds had been collected in Japan and the two plants resulting from these were placed in the Japanese garden in April 1967 when four feet tall. The record card in the Arboretum file does not show what happened to them, but they may well have been killed by cold in two successive winters of 1971 and 1972, particularly the latter when minimum temperatures of 9° F. in December 1972 and 10° F. in January 1973 were recorded here (see *Arboretum Bulletin* 36(1):18, Spring 1973). At any rate they are no longer there.

The second and still-living example of this species was a small plant in a gallon can donated by the late Donald Stryker of Langlois, Curry County, Oregon, in November 1963, but labelled *Quercus myrsinaefolia!* This plant evidently survived those cold winters in the upper lath house and was planted out in March 1974 on the ridge at the north end of the oak section, along with a true specimen of *Q. myrsinifolia* from Osaka, Japan. The differences in size, shape and coloring between the foliage of the two plants are quite marked, that of *Quercus myrsinifolia* resembles an evergreen willow. Unfortunately the leading shoot of Mr. Stryker's plant was broken out in 1981 and the tree, now only seven feet in height, is consequently not very well shaped at present. With time and no further injuries it should improve.

Despite the specific name *glabra,* meaning "smooth" the young shoots are densely pubescent, more slender than those of *P. edulis,* with the leaves scattered along them. The leaves, 10 to 12 cm long and 3.5 to 4.5 cm wide, are lanceolate, thinly coriaceous and flexible, the apex acute to short acuminate, the base wedge-shaped, the margin usually entire but sometimes slightly undulated in the upper half. The upper surface is slightly shining with 7 to 8 pairs of deeply impressed veins, the underside much paler with a coating of scales on the surface and pubescent on the raised veins. The petioles are slightly scaly and pubescent, about 1.0 cm long.

Pasania glabra is native in the central and southern parts of Japan, in Taiwan and in southeastern China.

Genus LITHOCARPUS

Lithocarpus henryi

The only Asiatic species of *Lithocarpus* established here is *L. henryi,* a native of central and western China where it can become a large tree of 50 to 60 feet in height. It was introduced to cultivation in England by E. H. Wilson in 1901, but by 1966 had only attained a height of 30 feet there.

The first plants grown in the Arboretum came as seeds from the United States National Arboretum, Washington, D.C., in January 1965; they had originally been obtained from the Lushan Arboretum, Kiukiang, China, in 1940. One sapling was set out near the path to the East Lynn Street bridge in February 1974 when six feet tall; it is now 11 feet, and a thriving small evergreen tree with unusually large foliage. Two others from the same lot followed in April 1976;

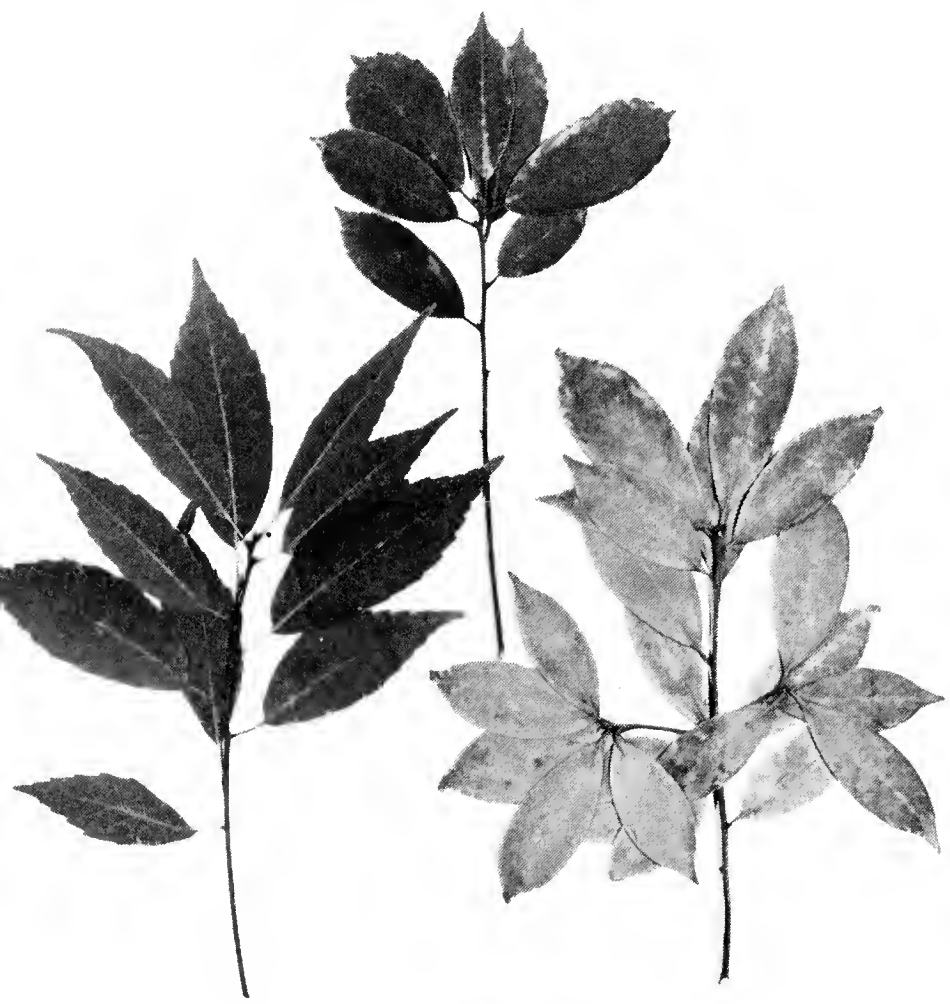
one of these is now 8½ feet in height, the other was broken by vandals in May 1978 and had to be retired to the nursery.

In September 1967 three small plants were received from the same source. One was planted close to the others in February 1974 when four feet tall; it is now only seven feet, with four stems instead of a single trunk, but is healthy. Another was moved when 11 feet tall in March 1983 from the nursery to the Himalayan hillside above Azalea Way, where it is shaded by large native maple trees *(Acer macrophyllum).*

The young shoots of *Lithocarpus henryi* are green and smooth. The large leaves, which remain for three years, are lanceolate, coriaceous, long acuminate at the tip and decurrent at the base down the petiole; they average 15 to 20 cm long (but up to 27 cm on vigorous young shoots) and 4 to 5 or even up to 6 cm wide. The leaves are quite glabrous, dark green on the upper side with a raised midrib, paler green beneath, with 10 to 12 pairs of veins; the margin is recurved but entire. The petioles are 1.5 to 2.0 cm long. The fruits take two years to ripen.

With its very distinctive and striking foliage this species should form a conspicuous small tree under our conditions, especially when it reaches the stages of flowering and fruiting.

Foliage of species of *Quercus:* (left to right) *Q. myrsinifolia, Q. gilva, Q. sessilifolia.* Photo: I.M.S. Production Services, University of Washington



Genus CASTANOPSIS

An early introduction to the Arboretum, in November 1938, were two plants labelled *Quercus acuta,* given by Mrs. O. B. Thorgrimson, one of the staunch supporters of the Arboretum in its youth. She supplied a number of different kinds of oaks during 1937 and 1938, some of which according to our records came from the Arnold Arboretum.

One plant was eventually placed in the oak section close to the north entrance, probably about 1945, although the date of planting was not noted at the time. Following the severe early freeze of November 1955 the young tree lost its leader and was badly burned, but five years later had recovered and was making good growth.

In the process of checking these evergreen oaks for this article it was suspected from the evidence of the foliage and shoots that the plant was probably not a *Quercus* but more likely to be a *Castanopsis,* probably *C. cuspidata* or a variety of it. A specimen was therefore sent to Dr. F.G. Meyer, botanist at the National Arboretum, who confirmed this supposition and the identification. So our tree promptly received a new label! It is now a bushy small tree 16 feet in height, branched almost to the ground, located behind a large *Rhododendron* 'Mrs. G.W. Leak' and beneath a large native maple tree.

Castanopsis cuspidata is particularly common in the warmer parts of Japan, where it may reach 70 to 80 feet in height and is grown in both public parks and private gardens. It also occurs in Korea, but not in Taiwan, and is very rare in China. The acorns are edible.

Later introductions to the Arboretum were by means of seeds from the Botanic Garden of Osaka City University, in April 1957. One resulting seedling was placed near the north end of the Japanese garden in November 1961 but was killed in the winter of 1964. Five others planted there between 1962 and 1971 all failed to survive more than a few years, so evidently this particular stock was of too southern an origin to be hardy with us. The latitude of Osaka is about 35°N., compared with 47°-48° N. for Seattle. Stock from Korea should be considerably hardier.

Another plant given as a year old seedling by Carl S. English, Jr., in March 1957, was planted three years later in the southwestern part of the oak section, but was destroyed by vandals late

in 1961. Except for the original plant from Mrs. Thorgrimson we have not had much luck with this interesting species.

On this example the young shoots are slender, flexible and glabrous; the leaves remain for two seasons and at first glance much resemble those of some camellia. They are 10 to 11 cm long by 5.0 to 5.5 cm wide, ovate or ovate-oblong, coriaceous, arranged alternately on either side of the branchlets, somewhat shining on the upper side but covered on the lower with minute scales which provide a metallic luster. The apex is acuminate and deflexed, the base wedge-shaped, the margin usually entire but often undulate and sometimes with crenations near the tip. There are 7 to 8 pairs of veins which do not extend to the margin; the midrib is prominently raised beneath. The petioles are 12 to 15 mm long, glabrous. The first inflorescences were observed developing in early May this year, after nearly 40 years in this site; they are produced in the leaf axils of some of the new shoots. The male flowers are borne in short, slender racemes 3.0 to 4.5 cm long and consist of clusters of stamens; no female flowers were found.

The Arboretum's plant may prove to be a form of the species named *latifolia* by Rehder and Wilson in 1916; in the type the leaves should be only 2 to 3 cm wide, and ours are wider. Ohwi (1965) distinguishes the variety *sieboldii* by the fissured bark of the young trees, the thicker leaves and the larger acorns.

Plants at the Carl S. English, Jr. Gardens, Seattle.

While the Arboretum collection of evergreen Asiatic oaks was gradually being assembled another was also being formed by Mr. English, in charge of the seven acres of grounds at the H.M. Chittenden Locks in Ballard from 1940 to 1974.

Full details of his acquisitions in this particular group of trees are lacking but he is known to have obtained many kinds by seed exchange with other botanic gardens and arboreta, as well as from private individuals in various countries, including (and perhaps especially from) Japan. We have evidence of this in the plants given by him to the Arboretum of *Castanopsis cuspidata* and *Pasania edulis*.

An inspection during March 1983 with Mr. Michael Fleming, now in charge of these Gardens, showed the following species growing there, and their present sizes.

Quercus glauca: three plants 18, 11, and 13 feet tall. The largest tree is just west of the Administration Building.

Q. phillyreoides: one tree 26 feet tall with three stems 5 to 7 inches in diameter. This tree is located between the Visitors' Center and the Administration Building.

Q. myrsinifolia: two plants 14 and 16 feet tall. The larger is just inside the entrance gate to the grounds, on the left side of the road.

Pasania edulis: one plant over 11 feet tall. It is growing in area #17 on the map of the grounds, overlooking the canal, with the other *Q. myrsinifolia*.

Castanopsis cuspidata var. *sieboldii:* one plant 7 feet tall. This differs slightly from the Arboretum tree of this species in having rather more elliptical, less coriaceous but more frequently toothed leaves.

In general, these trees are thriving and look well in the more open situations than most of those in the Arboretum enjoy. The specimen of *Quercus phillyreoides* is particularly notable.

Foliage of *Pasania edulis* (left) and *Castanopsis cuspidata* (right). Photo: I.M.S. Production Services, University of Washington

At the Botanical Garden of the University of British Columbia

An enquiry to Mr. Bruce Macdonald, Assistant Director at the Botanical Garden, has elicited the information that only two of the species mentioned in this article are growing there, namely *Castanopsis cuspidata* and *Quercus phillyreoides*. The former is a young plant in the Asian Garden, set out in 1979-1980, now 6½ feet in height; it has shown no signs of damage from winter cold up to the present. The latter is an older specimen, planted about 20 years ago in the Physical Plant nursery on the campus; it is now about 18 feet tall and also has no evident signs of damage from cold weather. Since the climate of Vancouver is distinctly colder and much wetter than that of the Puget Sound area *Q.phillyreoides* is evidently quite well suited to those conditions. Perhaps *Q. myrsinifolia* and *Q. sessilifolia* should be tried there also?

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Foliage of *Castanopsis cuspidata* from a tree at the north end of the Arboretum.
Photo: B.O. Mulligan

Notes from the Arboretum Foundation

AWARDS! Captain and Mrs. Arthur Gardiner were awarded a Certificate of Merit by the Seattle Garden Club at their annual meeting on June 16, 1983, in appreciation of "their enrichment of the garden life of Seattle."

OLD BULLETINS NEEDED! If anyone has extra copies of the *Arboretum Bulletin* from 1980 (Volume 49), especially Spring and Winter, please bring them to the Arboretum Foundation office. Thank you.

News from Urban Horticulture

Dr. John A. Wott, Professor of Urban Horticulture, was recently elected president of the International Plant Propagators' Society at the annual Board of Directors meeting in Aberdeen, Scotland. Congratulations to Dr. Wott on the occasion of this honor.

Errata

Volume 45, No. 3, page 16, Fall 1982

A note from Dr. Herbert Baker, author of "A Tribute to the Amateur in Botany": "There is just one slight problem that arose from the condensation of the part (of the manuscript) dealing with R. Darnley Gibbs and his simple biochemical tests. The cigarette and hot water tests are made to sound as if they were for cyanogenesis whereas they were for phenolics, etc. The test for cyanide production that he introduced was one that used a strip of filter paper dipped in sodium picrate solution."

Furthermore, Dr. B.J.D. Meeuse has mentioned that tests similar to those used by Gibbs were used by M.W. Beijerinck and Hans Molisch in the early 1900's.

Classes of Interest

Urban Horticulture— Arboretum

These classes are open to the public; many of them start in early January. To register and for further information call (206) 545-8033.

BIRD IDENTIFICATION FOR BEGINNERS, with Merilyn Hatheway, six Saturday mornings.

URBAN FRUIT GROWING, with Gary Moulton, one Tuesday evening.

FRUIT TREE PRUNING WORKSHOP, with Gary Moulton, one Saturday.

PLANTS INDOORS, with Cheryl Trace, four Wednesday evenings.

GRAFTING, with Richard van Klaveren, two Saturday mornings.

ADVANCED CUTTINGS, with William Halstead, one Saturday morning.

BONSAI FOR BEGINNERS, with Jane Nelson, six Saturday mornings.

GREENHOUSE GARDENING, with Sue Stockton, three Saturday mornings.

LANDSCAPE PRUNING, with Fred Hoyt, two Saturday mornings.

PLANTING TO ATTRACT BIRDS, with Stephen Penland and Philip Fortunato, two weekday evenings and two Saturday mornings.

PLANT PHOTOGRAPHY, with Bernard Nist, one Thursday evening and one Saturday morning.

CALIFORNIA GARDEN AND WINERY TOUR, with Dr. John Wott and Van Bobbitt, the entire first week of April!

University of Washington Continuing Education

Some of these classes begin mid-January. For information call Spectrum, (206) 543-2590.

TALK TO THE ANIMALS, with David Beletsky, Tuesday evenings January through March.

KAYAKING THE WILD PACIFIC COAST, with Randel Washburne and Linda Daniel, six Wednesday evenings.

WINTER SCENES OF SEATTLE: A PHOTO FIELD TRIP, with Joe Freeman, one Friday evening, one early Saturday, and a Thursday evening.

WINTER BIRDS OF SAN JUAN ISLAND, with Dennis Paulson and Jim Erckmann, a weekend in early February.

PILOTING AND COASTAL NAVIGATION, with Ric Weyrick, ten Tuesday evenings.

Events of Interest

ARBORETUM LECTURES take place on Wednesday mornings at 10. On January 11, hear George Pinyuh speak on "Broadleaved Evergreen Trees for Puget Sound Gardens." On February 8, William Halstead will present "Gardening in the Shade," and on March 14, Dr. Harold Tukey will discuss "Foliar Nutrition, the Contribution Leaves Make to Whole-Plant Nutrition." Call the Arboretum, 543-8800, for further information.

FOURTH THURSDAY WEEDERS' DAYS resume in January: January 26, February 23 and March 22.

Washington Park Arboretum Bulletin

Summer 1983

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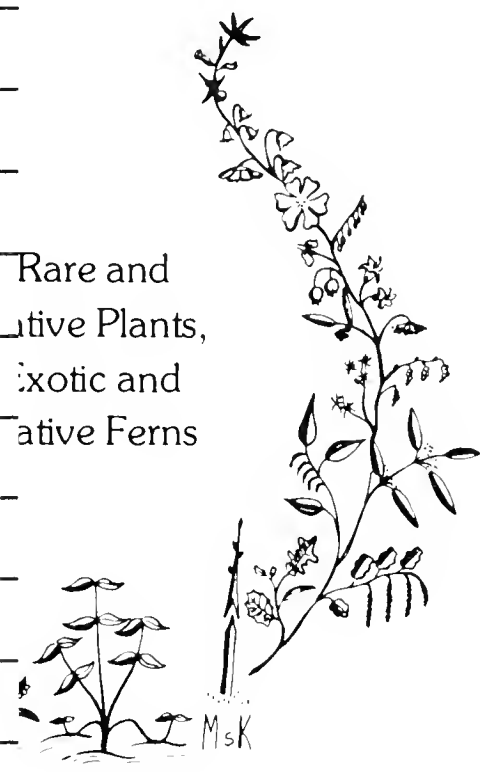

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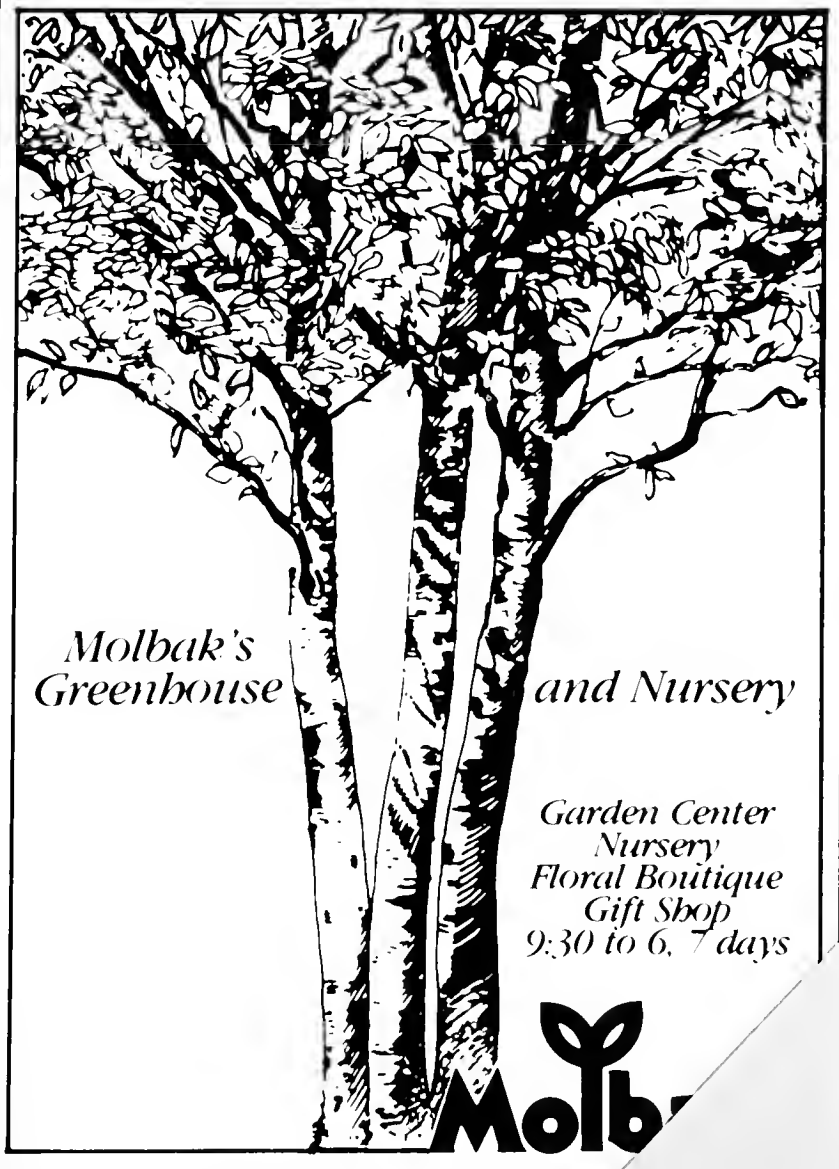

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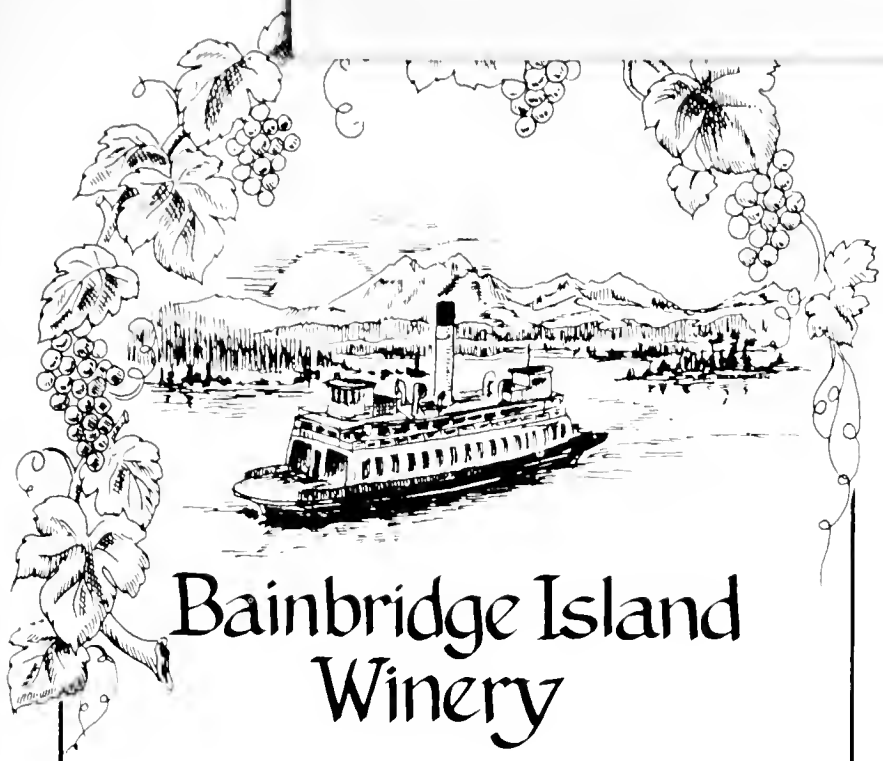

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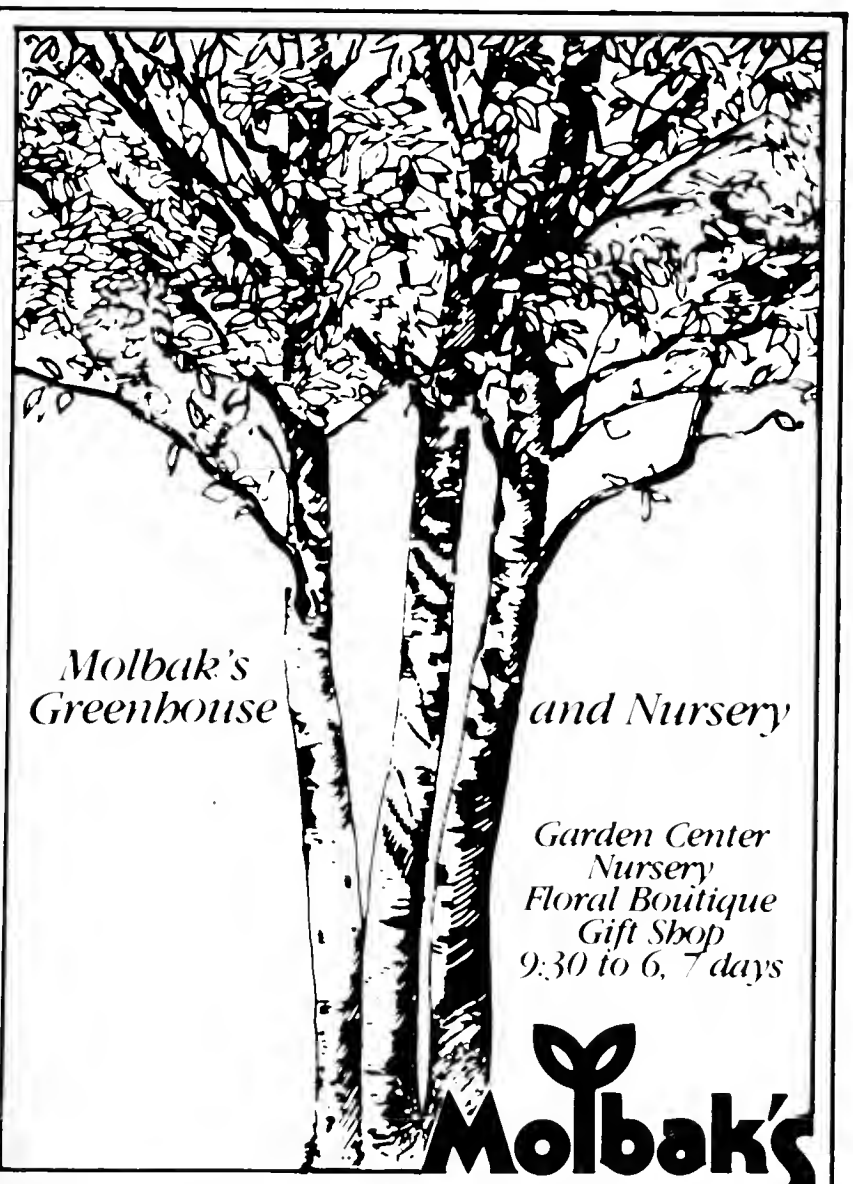

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Friends of the Japanese Garden

Twenty-five years ago this summer two men stood at the edge of a pond in Washington Park and thought it might be a good place to build a Japanese garden. Two years later the plans were complete, funding was arranged, and work was started on what was to become one of the most beautiful and authentic Japanese gardens build outside of Japan. We were fortunate beyond words to have Juki Iida, the builder of over a thousand Japanese gardens, take a personal interest in our garden, even coming here from Japan to supervise its construction.

Now, twenty-five years later, we have a garden that is maturing, still a showcase for Seattle, with its authenticity intact, thanks to a handful of friends who have watched over it all these years. But we are looking for others who will take up the work and help the City of Seattle Park Department maintain its authenticity while at the same time look after the myriad needs that go with a three-and-a-half acre Japanese garden.

The first Charter Meeting of the Friends of the Japanese Garden was held in October at the Seattle Art Museum, followed that weekend by a productive and beautiful day of leaf-raking and maple appreciation. Various types of memberships considering the interests of members and the needs of an authentic Japanese Garden are offered.

The second organizational meeting will be held January 24, 1984 at the Seattle Art Museum, 7:30 pm. By joining this group you support and preserve this "Seattle Treasure." Call 546-2318 or 283-3232 for information.

WINETTE WAGGONER

EXPLORERS' WALKS will continue to be offered by the Arboretum Naturalist on the fourth Wednesday of each month: December 28, January 25, February 22 and March 28, 10 AM to noon. Meet at the Arboretum Office and wear warm clothing and adequate footgear.